IN THE NAME OF GOD
THE BENEFICENT, THE MERCIFUL

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BY THE PEN AND BY THE (RECORD) WHICH (MEN) WRITE.

(HOLY QURAN, 68:1)

CENTRALITY IN THE STRUCTURE OF BUILT ENVIRONMENT

A STUDY IN THE STRUCTURAL TRANSFORMATION OF SOCIETY AND SPACE

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BSc ARCHITECTURE
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THESIS SUBMITTED FOR THE DEGREE OF DOCTOR OF PHILOSOPHY

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OCTOBER 1998

DECLARATION

Except where otherwise acknowledged this dissertation is entirely my own work.
Shahindokth Barghjelveh

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ACKNOWLEDGEMENT

Praise be to Allah, Lord of the worlds, by His will the accomplishment of this study is made possible; and may His blessing and peace be upon His Prophet Mohammed.

The study reflected in this dissertation was carried out in Britain and Iran and was only possible because of the kindness and assistance of many individuals and institutions.

It is a pleasant task to express my deep appreciation to my supervisor Adrian Napper, Director of School of Architecture, whose support, encouragement and positive criticism has greatly helped in the making of this study. His interest in the subject, scholarly guidance and enlightening comments are invaluable.

I would also like to record my gratitude to my second supervisor Dr Faozi Ujam, Director of the Edinburgh Centre for Research Studies in Architecture and Urban Design, for his guidance, advise and encouragement. My special thanks to him for his constructive comments in my study.

I would particularly like to thank the Ministry of Culture and Higher Education in Iran. I am grateful to all those who have confirmed the quality of this study while it was in production: Dr Salar Amoli, Dr Khodaei and Dr Ivazian for their continual support and encouragement in evaluating research records; and Mrs Tadayyon and Mrs Shirazi for their great help which I received during my study in Britain.

The same qualification is true for others who gave particular help in qualifying the study in Britain: Professor Peter Aspinall whom I benefited the valuable discussion on research methodologies; Professor Alistair Rowan, Rosie Hall, Moira Seftor, Ann Rennie and the others for their kindness in providing the research facilities; Emma Plant and Daniel Willem De Iongh who were kind in their responses to my linguistic questions and generously helped me to find appropriate ways of putting the argument comprehensively into text; and my colleagues in the Faculty of Environmental Studies who gave me invaluable guidance in refining my thoughts.

During the course of the study a number of papers, based on the different parts of this dissertation were presented at conferences and workshops. I should like to express my thanks to the 3rd International Conference on Reconstruction of the War-Damaged Areas in Tehran University; Edinburgh College of Art Senior Seminars Programmes; Iranian Students Conference on Humanity; Ministry of Housing and Urban Development Seminars on Housing Development Policies in Iran; 13th Inter-schools Conference on Development in University of Huddersfield; and 14th Inter-schools Conference on Development in Centre for Environment and Human Settlements at Edinburgh College of Art. They, by endowing some of my papers, made me confident to make this syudy possible.

Individual acknowledgement is not possible for those who cooperated at length in responding

to the questionnaire. But, I must express my deep appreciation to Meshed's kind citizens, who took part in the survey, for their patience in long and detailed interviews. I am also much beholden to Mr Abbas-Zadeh and his family for their warm hospitality, and helping me to carry out the procedure of the fulfilment of the questionnaire; and Mr Mohseni and his family for all the help they gave me during my visit to Meshed, which included providing me with research information. I am also deeply grateful to those in Astan Quds-e Razavi who granted me access to the Holy Shrine of the Imam Ali-Ibn-Musa-al-Reza (peace be upon him) and to their collections of documents.

Without all these kind and helpful people the study would not be accomplished. I hope they can all take pleasure in the result.

ABSTRACT

Born out of a long term interest in thought and social values and nearly ten years of involvement in space and design as a student of architecture and urban design, this dissertation aims to make a contribution to both the structural theory of the transformation of society and space and to our knowledge of the principle of centrality in the structure of built environment. It looks at the concept of centrality in the Iranian city of Meshed. However, this is not intended as a study of a unique experience. Rather the spatial and temporal co-ordinates of the text, Islam and Iran, and the historical period of Modernist thought, offer a framework within which theoretical and principal questions of a more general nature concerning the structural character of society and space can be explored.

The emphasis throughout is on the concept of the *social production of the built environment* at the centre of which lies the *ideal process*, understood in its most general sense as purposeful human activity. The dissertation seeks to show how changes in the relations between the elements and actors of production, the physical and mental means by which the built environment is created, and the relation between moment and totality within which the production process occurs, are central to an understanding of the structural transformation of human society, the form of city and the organization of space.

INTRODUCTION

Propounding the Subject
Objective
Problem
Structure of the Study
Research Methodology

Propounding the Subject

The initial thought of the topic started in 1990 while the author was an undergraduate student. At the time there were many changes to the process of building and rebuilding cities and their parts. There were two main reasons for the changes. Firstly, the Iranian population was expanding rapidly, as it exploded from 25 million into nearly 50 million in a decade. Secondly, the new regime after the Islamic Revolution started new reforms in all aspects of life by facilitating the use of more resources and energy. These reforms were supported by new ideas of professionals and experts, i.e. planners and designers, in order both to conserve historic places and to create new ones befitting to the new modern era.

At that time the author was stimulated by the concept of 'centrality' which was one of the few concepts discussed in a new trend towards realizing the traditional aspects of the built environment and the dominant role of this concept in shaping and reshaping new and old cities. There was in fact a sympathy with keeping and preserving the traditional urban centres. However, the inadequency of courses in propounding scientific and philosophical evidence, and also the lack of a strong relationship between them and executive sectors usually led to nowhere, and the results were almost unacceptable. There was always and still is a need for appropriate concepts to investigate the routes of achieving more knowledge and information in order to guard against creating further problems.

The question arose as to how the proper definition of centrality fits into the long string of theories and themes within urban design, the author started to emphasize more on the process of 'change' which is found in the structure of society and the structure of built environment, and the important relation between these two. During many urban developments, most of the public and private spaces change in a way that either are not accepted by the people or create many problems whose solutions require many efforts.

Nowadays, for instance, the plans for the future development of the historic core of the Iranian city of Meshed include hotels, shopping centres, and also parking areas around its Holy Shrine in the centre. These follow on from an urban replanning campaign of the forties, when radical urban changes emerged in most Iranian urban textures including Meshed by

building through the construction of broad streets and belts around the urban centres. As allowing cars to access the heart of the city (Figure 1) resulted in breaking up the texture of the area, separating the Holy Harem[1] physically as well as spiritually from the rest of the city (Figure 2), the question has remained whether access means for people spending less time or it is an unfolding participation in place which takes them to their destination?

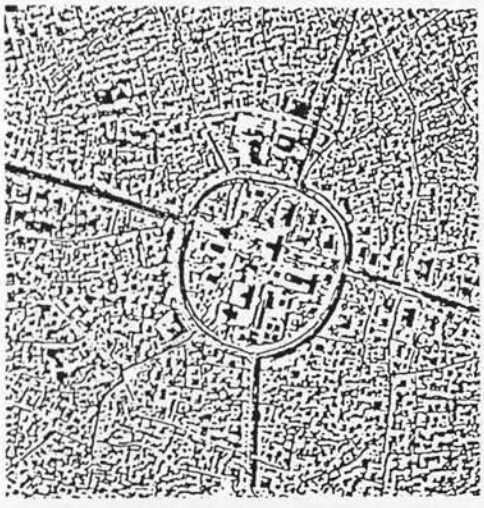

Figure (1) Meshed, Historical Centre, 1935

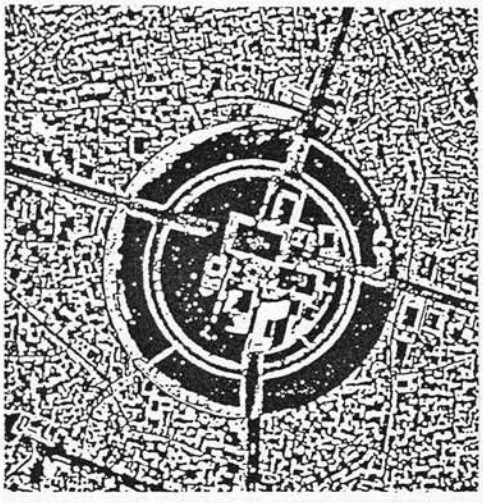

Figure (2) Meshed, Historical Centre, 1985

Inspired by many cases of this kind, the study developed around an attempt to open up a discourse about 'centrality in the structure of built environment' which is addressed to scholars and students as well as to planners, administrators and others concerned with a more analytical understanding of the process of change and development in the process of human life and the built environment. This work is about the way that societies change and the reasons why sometimes they suffer from the changes which occur in their built environment: how the leading principles embedded in the traditional way of life are neglected; and how the locus of these principles lose their pursuits in their own built environment.

As mentioned before, the origin of the thought goes back to 1990 when some debates on

[1] The Holy Shrine of the Hazrat Imam Ali-Ibn-Musa-al-Reza (peace be upon him)

development and change were discussed in a series of seminars and courses in different departments of architecture and urban design. In fact, these programmes brought the author's attention to the potentials of society and space on a local scale, and the reliability of people's participation in the process of change itself. It was, therefore, more concerned with the people who reside in the local built environment, and for this kind of attention there were always many concerns about institutional preference in the process of producing the built environment. Hence, such questions of how it is possible to identify the central principles embodied in the traditional way of life and the built environment which might enable planners and designers to help local societies to *reorganize* and *change* their own built environment became more relevant.

The author has always felt a deep concern with the mechanisms by which living entities operate and, parallel to this, an appreciation of how people behave and think. This led to an interest in biological and sociological texts in order to benefit from an understanding of these. Though neither field is directly relevant to theories of the built environment - the professional field of the author - it was instinctively realised that the underlying truth of living and thinking systems should naturally be appropriate to artificial domain and clarify many positive criteria. This led the author to consider formulating a hypothetical stance which could be tested against - perhaps supported by - an actual case study. By induction and distillation, fused with personal observations and reflection, a range of concepts from disciplines remote to design were transposed and synthesised into the single hypothesis of centrality that is the theme of this study.

A study of the natural world reveals that there is a dominant process used by organisms to deal with an environment of great complexity. This process combines components such as hierarchy, symmetry, contrast and rhythm to interpret complexity into a comprehensible context for transformation and development. Through the review of biological and sociological texts, the author noticed that the organisations of organic entities and human societies had strong parallels that conformed to the concept of centrality. Centrality allows living systems to simplify the inherent complexity of their interrelating components into general patterns which can then be used to enable existence. The author's interest in the idea

of centrality occurred from the observation of a number of natural phenomena understood through a knowledge of the resource that of philosophy of science. Thus centrality can be seen to conform with many phenomena. It is a way of looking at and appreciating the combination and differentiation between the parts and the whole of any entity at any scale - for example, individuals to society, systems to structure and biological/pre-programmed systems to purposeful ideal-seeking system. In itself, this understanding alone forms an enabling tool that directs readers to a new attitude which will help them reassess their appreciation of associated ideas such as holism.

Centrality is a world view through which an almost unlimited understanding of the world can be gathered. The study focuses this idea onto matters of urban design and architecture, although its implications are more wide-ranging. An appreciation of centrality opened up for the author a new theory and understanding of urban design which lent a new level of meaning to concepts such as the built environment and the city centre. Discussion in urban design, for example, mentions concepts such as space, social structure and theories of urban design and these are all encapsulated within and clarified by the notion of centrality as a tool for thought. The application of the idea of centrality to the spatial phenomena of design introduces the designer and the user to a new appreciation of space that would otherwise not exist. This is a notion that embraces diachronical and synchronical characteristics and interrelates the biological fact of the individual to the phenomenon of space.

The method of identifying central principles, therefore, forms the basis of an approach to understanding the 'process of change' itself. It asks questions linked to the precise character of the relation between 'parts' in the 'whole'. It does this largely through an analysis of the 'idea' and the 'form' that man takes at permanence life. This requires a discussion of how we might characterise not only 'life' but also the 'built form' as a *continual process of production*. It arises from the most general theoretical discussions into the nature of social production, proceeding to the examination of particular tendencies in the *production of built environment*. It is concerned with the parallels between these organizations revealed in three studies: (1) of living organisms to see how their organizational order emerges from the genetic structure or the centre; (2) of social organizations in order to compare them with other living systems to

discover their organizational centre; and (3) of how the process of producing the built environment is also affected by its centre.

Objective

The main objective of the subject is thus to provide an understanding of the principle of centrality in the process of producing the built environment. This understanding also leads to a world view of building the environment. The analysis can act as a guide to planners and designers, directing them to the main problems which they face in planning and design. Since the focus of the subject is conceptual, it neither has a focus on to any specific, i.e. unique, problem nor attempts to prescribe any specific solutions. Rather, it opens up a new discourse and opportunity for others to do so. In fact, it is a widely applicable debate for planners and designers which raises many questions besides attempts to answer them which is of course the nature of discourse itself.

As mentioned before, for this kind of emphasis there is a concern about 'institutional' preference which is led to a concern about 'organizational' preference in the process of producing the built environment. In other words, the study is concerned with outlining an approach to understanding the means of a kind of life-practice of people who want to be purposeful in organizing their own ideals. It is involved with emphasizing differences in development plans and strategies, especially in those aspects of everyday life which are related directly to the ideal qualities of a local built environment, and also with determining what sorts of factors are associated with this access. It is concerned with an approach to understanding the diversity of development plans and strategies found in the built environment disciplines, with the notion of bringing this knowledge to bear in designing the future. In other words, the subject outlined here is designed to provide a beginning in developing such a base of understanding.

It is worthwhile, therefore, to be more directly focused on the emphases of recent urban developments and to be more pointed about what is principal omission in the every day practice of different disciplines. An inspection of the output of different agencies - governmental or private sector - across the world, which is done by the reviewing the relevant

literature and bringing out the supportive case studies, indicates a strong preoccupation with the supply side of the picture and a relative insensitivity to people whom these plans and programmes are in part intended to serve. Although there has been a long tradition of dedication to the 'public interest', and much is being said these days about community goals and people's participation, there appears to be very little consensus or clarity about why these are necessary. The overriding question seems to be how such ideas can be applied in the real world and why. In fact one of the most demanding problems which will tax human ingenuity in the next few decades will be how to retain human values and ideals in the face of escalating urbanism.

Problem

As a starting point of clarifying the problem it is competent to mention that science has moved both up and down the scale of phenomena, extending throughout the levels of organization of 'matter' and 'life'. At one extreme, physics has penetrated to the lowest levels of physical reality, and at the other extreme, the theory of evolution has appeared to open up the higher levels to a scientific enquiry. This differentiation of the universe into a multiple hierarchical level leads to the problem of relations between the different levels[2].

From the other hand, it is necessary to remind that being hierarchic in living systems requires that the system controls its dynamics through an internal record which has some aspects of self-observation[3]. That living matter is distinguished from non-living matter in the final analysis, not because of its 'molecular structure' and its 'hypothesis', but because it evolves in *time* - i.e. its 'function' - in a course which laws of motion have not yet suggested.

In fact many biologists realized long ago, that the more we learn about the detailed relations of biological *'structure'* to its *'function'*, the more difficult becomes the problem of how these relations between 'structure' and 'function' arose. In biology it has become so clear that we get

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[2] Hillier et al., 1972, "Structure, System, and Transformation: Sciences of Organization and Sciences of the Artificial", London University College, Bartlett Society, Transaction, V. 9, pp. 36-77.

[3] Pattee, 1970, "The Problem of Biological Hierarchy", in Waddington, C. H., (eds.), *Towards a Theoretical Biology 3*, IUBS Symposium, Edinburgh University Press.

nowhere by separating the reduction-type question *how does it work* from the origin-type question *how did it arise*. These are really two ways of viewing the same basic problem: the problem of the description of *'hierarchical interfaces'*. **This is in fact a valid criticism for narrow theories which try to guess *how things work* at one level, but the root of this problem is clearly not in the *'detailed facts of one level'* or another, but in the *'relations between levels'***.

This method of tracing *hierarchical interfaces* or *the hierarchical order of different levels in 'time'* forms the basis of an approach to understanding the process of change in social living systems. The question is what answer do we have to the nature of the formative influence of this hierarchical order which is responsible for the generation of the characteristic structure of the thought in human societies? What answer do we have to the emergence of symbolic principles of the social reproduction which order the instrumental principles of everyday production and exchange? And finally, **what answer do we have to the *'emergence of the artificial order in cities'*, particularly that of creative, novel, order**?

The study tries to explain the 'principle of organization in living systems' to find out how the order of organization emerges from the structure or the centre, and to see how the process of producing built environment is also affected by its centre. It is about the principle of centrality in the structure of built environment which defines not only visible properties of the principle such as form, and function and hierarchy, but also the structural characteristic of centrality which is itself an invisible property of this principle. It is responsible for introducing 'time' and 'data information' to achieve *change* and *transformation* in the hierarchical process of social space.

The complexities of social life cannot of course be reduced solely to the process of living systems. But neither can social life be explained without such a concept. Seen in this light, the 'natural process of life' as a **'fixed pre-programmed living system'** is replaced by a 'social process of purposeful life-practices' as an **'open-ended self-conscious and self-ideal programme of social system'**, a process that corresponds to the emergence and continual process of transformation of order in a social reality, one in which all changes in the

production of urban space are interdependent. These transformations are all related to the 'concept of centrality in the structure of built environment', which exists at all levels within the social totality. The interdependency of society and space, therefore, emphasizes that there is a mutual relation between the principal changes of the built environment and the behavioural problems of the social reality. In other words, societies face problems in the process of producing own socio-spatial systems.

Within this respect, to gain an insight into the complexity of the meaning of centrality, the analysis hypothesizes on that alternative picture of the natural world which believes in 'process'. The picture expresses the notion that any changes we notice are not secondary, arising from the 'interaction of elements', but, they are elementary, organising the 'relations between elements'. The analysis, therefore, begins with the emphasis on how the order of this organization emerges from the structure or the centre. It indicates that the emergence of the organizational order in time, which is the constant reorganization of system itself, is the most important indicator of the transition.

In this approach the theory of the relationship between parts - which is the whole - is explored. It is also argued that it is the difference between the *functional* quality of 'process' in time from **'genetic programmed'** to **'self- ideal programmed'** or from **'fixed pre-programmed functional quality'** to **'open-ended purposeful functional quality'** that largely accounts for the properties of the process itself. Accordingly, in any 'open-ended symbolic programming' such as a built form, the relations between spatial elements that establishes the pre-conditions for the self-conscious process of the emergence of symbolic order in time is the central question to our understanding of *what* gets built, *how* and *where*.

The analysis begins with the ordered social relations that dominate daily social life and proceeds to the examination of general characteristics of social production, of which the creation of the built environment is one. To understand the predicament of some Islamic cities like the Iranian city of Meshed, we follow a similar logic. Major features of this examination include speculation on the character of modernist thought of design in the late twentieth century, the simultaneous internationalisation and concentration of instrumental principles, the

emergence of transnational design ideas, and the pursuit of free design built structures.

Since, as a willing partner in these shifts, the Iranian state has attempted to regulate design activity overwhelmingly in the interests of instrumental principles, the result has led to an inevitable confrontation with modernising developments. These have all set the framework by which needs in the built environment are almost entirely judged by commercial considerations instead of purposeful ideals, in which control over the built environment has been concentrated in the hands of a few corporations instead of local people. These changes have contributed to the increasing penetration of the idea of commodity into all areas of the production of the built environment, mirroring the tendency towards the total commodification of everyday life. It also mirrors the reality that people face problems in producing their own ideal life and their own ideal environment.

Structure of the Study

As our philosophy and world view depends on the concepts and ideas we use and how we use them to organize our perceptions of the world, and as fundamental changes in organizing concepts and ideas and the way they are used move societies from one age to another, Part One of this study aims to refer to three main modes of references: Chapter (2) to the development of a 'descriptive' approach of the concept of centrality in the structure of complex built forms ('individuating' the structure of complex built systems); Chapter (3) to debates on an 'explanatory' concept of centrality in the structure of complex built systems ('understanding' the structure of complex built systems)[4]; and finally Chapter (4) to a

[4] In a sense, the problem starts by looking at the complexity of a built system. It is usually seen in a 'descriptive' mode rather than 'explanatory' one, and even in an explanatory mode it is usually seen in the mode of *what produced it* rather than *what its function is* (Ackoff et al., 1972). Taking the body of evidence, for instance, the study of the principle of centrality in the structure of a built system may have different modes of research programmes. Among many, one is the 'descriptive image' of centrality which only individuates the complexity of the form of a built system. It considers the shape of the system whether geometric, physical or morphological. But, in the next mode it starts to have an 'explanatory concept' which means to have an understanding of the complexity of the system itself. It is itself usually of two sorts: (1) it may explain or understand how the system comes to be; that is, it identifies what produced it. For example, it may explain the presence of the centre in a city by saying, 'It was a religious place, or 'It was the original place for the growth of the city'. But, (2) it may also explain the centre by identifying what it can do or what its function is. It may explain by 'It is used to circulate the traffic' or 'It is used to regulate the order'. However, in this sense, to say that we cannot conceive of a particular thing is to say that we can not explain it, either we do not know what could have produced it or we can not determine what it can do, or both.

'simulative' approach of the concept of centrality by referring to the functional quality of the process by which complex built systems appear ('function-modelling' of the structure of complex built systems)[5]. At the end, Part One concludes a model which then in Part Two evaluates the real situation in Meshed's city centre. The evaluation is made either by general history of the study of urbanism in Iranian cities - Chapter (5) - or by particular analysis of Meshed's citizens' attitudes to current urban changes in the city centre - Chapter (6).

In fact, Chapter (6) describes the social survey which the author has carried out in Meshed based on an open-ended questionnaire which reflects people's attitudes to urban changes. The changes which have emerged according to the descriptive and explanatory approach of the concept of centrality rather than its simulative one. An analysis of responses is made to see how people are aware of the social changes which have been occurred following the urban changes. The result supports the importance of having close look to the concept of centrality which is being used in planning and design for both building and evaluating the environment.

Hence, the study consists of two parts: Part One chapters (1) to (4), and Part Two chapters (5) to (6). The first chapters of both parts i.e. Chapter (1) and Chapter (5) are set aside as introductory for each part. Chapter (1) to get some sort of understanding of relation between centrality and complexity, and Chapter (5) to get some background about Iranian cities in general and the city of Meshed in particular. There are essentially two thrusts to the work presented here. In Part One it is concerned to an inductive methodology of indicating the

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Therefore, the main question in our case is how actually a built form as a spatial property operates in everyday practice, what its function really is. But, this question may cover from 'non-living' qualities of function to 'living' qualities of function or from levels of 'framework', 'clockwork' and 'cybernetic' qualities of function in *non-living systems* to levels of 'pre-programmed', 'autonomous', 'self-conscious' and 'purposeful' qualities of function in *living systems*. This is the main theme of Part One in this study. In a sense, there are two reasons for this ruling: firstly, the articulate process of formulating theoretical concepts that man has at his disposal to deal with the highly complex world in general; and secondly, the study intends to show the lack of evidence on that alternative meaning of centrality which emphasizes on functional quality of the social living process in a complex urban system in particular. The study is an attempt to show how the available literature only gives attention to such studies as: sometimes 'individuating the complexity of urban forms' with refer to *what their shapes are;* and sometimes 'understanding the complexity of urban systems' only with refer to (1) *what produced them.* It actually omits the important one with refer to (2) *what their functions really are.* (for more details see Chapter 1 on descriptive images and the explanatory concept).

[5] F. S. Chapin (1974) proposes a four-stage programme for studying human activity patterns in the city: description, explanation, simulation, and evaluation.

generalization of the work itself (i.e. an inductive approach for modelling the hypothesis). And in Part Two, again from an application of an inductive strategy, it develops the underlying rationale for the study of the subject and its implications in the built environment (i.e. an inductive approach for evaluating the hypothesis). It translates the new conceptual view of the principle of centrality into a new analysis strategy, and examines field techniques used and problems encountered in making this approach operational (see Figure 3).

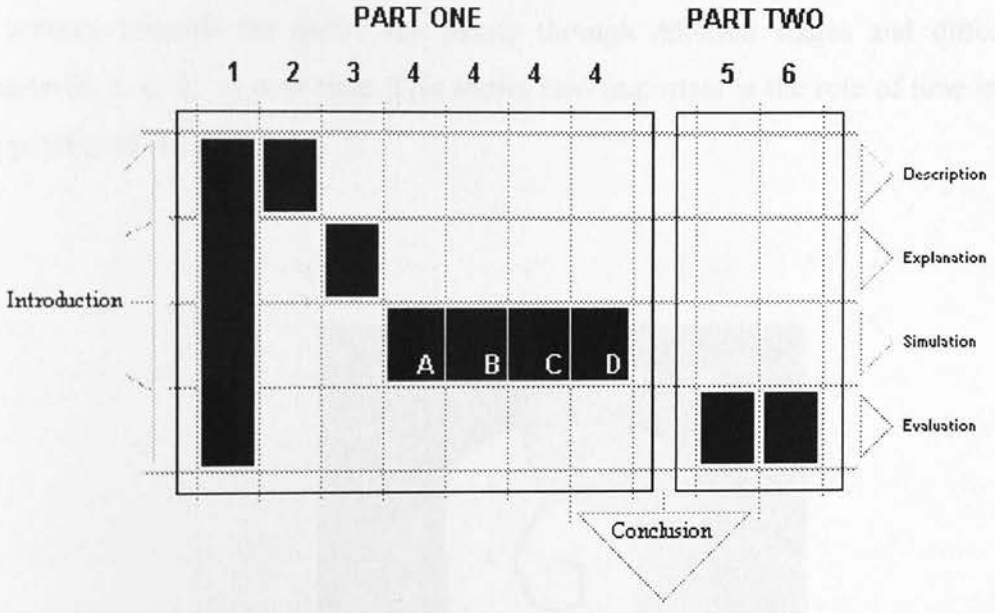

Figure (3) The Structure of the Study: A Model for Organizing and Structuring the Six Chapters of the Study. The direction of the research is from both sides, i.e. from Part One and Part Two towards Conclusion. (Source: The Author)

Research Methodology

Nowadays, development and change, especially in developing countries, are attracting more public attention and scholarly concern than at, perhaps, any other time in history: traditional urban structures have been seriously questioned and sweeping changes proposed; simultaneously, efforts are being made to penetrate the fundamental processes by which urban development plans operate. This effort calls for marshalling knowledge from a number of substantive areas. Sociologists, political scientists, economists, geographers, planners,

historians, anthropologists, and others have turned to the questions of development and change, and interdisciplinary projects involving scholars and activists are groping with fundamental issues.

According to this task and in close relation to research question, **the strategy of the research** may be illustrated as a spiral in Figure (4). It represents how the researcher is concerned about the research question in a very ambiguous way. But, by focusing on main issues, she starts to gather more information and evidences. The more relevant the information, the closer she is to the centre. Objectives and research questions keep the trend in right direction, and on an inward journey towards the centre she passes through different stages and different components (a, b, c, d, ...) over time. This shows how important is the role of time in an ongoing process of research

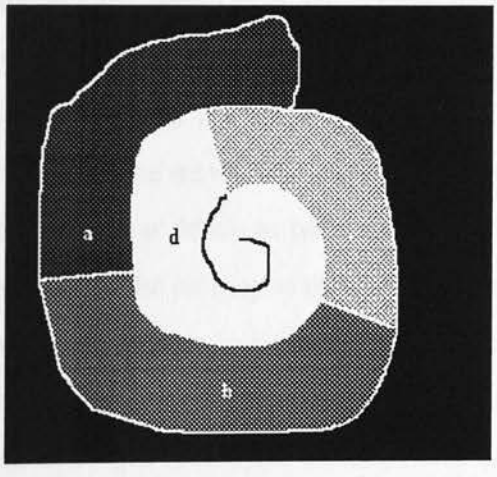

Figure (4) The Spiral as a Pattern for Research Strategy (Source: The Author)

From the other hand, when the researcher intends to communicate with other experts, for example, by a written study, she should have another strategy for editing a particular kind of systems drama. This seems to be different from the research strategy mentioned above. The common model for making it is a linear method with a start and an end points. In this case, a chain of hierarchical relations between words, sentences, paragraphs ... chapters, and parts

or different components of a written work is a necessity to understand the whole meaning of the texture or the selection of needed information (see Figure 5).

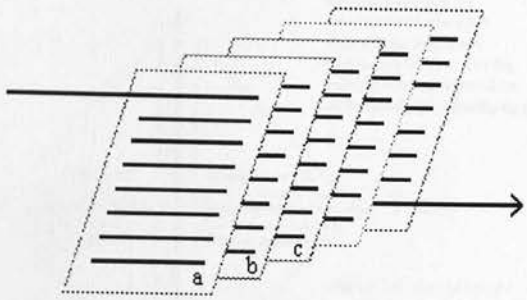

Figure (5) The Linear Relationship between the Components of a Textural Writing (Source: The Author)

But, describing **the research process**, a model is suggested to distinguish the process on two dimensions: (1) the 'here'-'there' dichotomy, and (2) the 'fluid'-'consolidated' dichotomy. It states that practical change involves a particular kind of systems drama: finding some practical route from *'here'* (the present situation and all the messy practical constraints, fears and opportunities that it involves ...) and making the mental and physical journey to *'there'* (some future state that we conceive, perhaps in clear detail, or perhaps as little more than 'getting away from here')[6]. According to this model, the journey in research is not only from 'here' to 'there', but also from 'fluid' to 'consolidated' or from 'analysis' to 'groundwork' (see Figure 6). But, the main question remains when to work and in which style? Much of the skill in effective action lies in knowing how best to mix these four styles of work, and quite a bit has been written on how to do it.

In fact the procedure of the research considers reversible time which is different from process of the operational research with irreversible time. It means that one can think of the four styles as rather like rooms in a four-roomed house. Living does not have a fixed sequence. One likes

[6] Carter, R., Martin, B., Mayblin, B., and Munday, M., 1984, *Systems, Management and Change,* The Open University, Harper & Row Ltd.

to move easily from one room to another when he or she need to. All the rooms work together as a 'system for living in'.

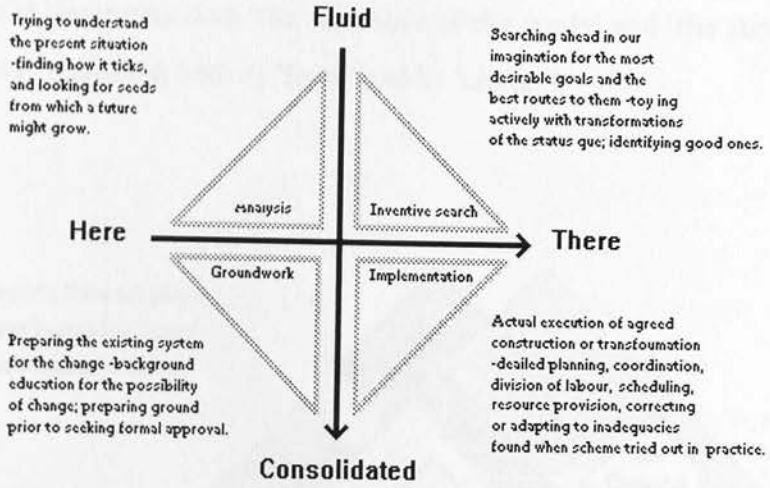

Figure (6) The Mental and Physical Journey from Here (Practical Change) to There (some Future States) and from Fluid (Bright Idea) to Consolidated (Real World) [Derived from Carter et al. (1984)]

The logical sequence from 'fluid' to 'consolidated' and from 'here' to 'there' is giving us as:

1) Analysis → Inventive Search → Ground Work → Implementation

But, it is not as simple as that, and implementation is rarely the 'last word'. All sorts of sequences can occur, for instance:

2) Analysis → Groundwork → Analysis → Inventive Search →
3) Groundwork → Analysis → Implementation → Analysis →

Hence, wether these sequences are relevant to all situations is not certain. Nevertheless, a degree of reality exists in all these sequences in case of research procedure. In this study, therefore, it is preferable to place Parts One and Two of the study in the sequence number (1) as mentioned above: 'Part One' for both 'Analysis' and 'Inventive Search' and 'Part Two' for 'Groundwork'. The application of the study which will be discussed in Chapter (6) will go for remaining part of the sequence (i.e. Implementaion of a new analysis strategy).

The underlying assumption of **the research methodology** is so modelled in Figure (7). The model indicates that the process of research could be similar to the process of design which always passes in a cyclic order, the modes of analysis, synthesis and evaluation in order to identify, define and specify some aspects of the research question. It helps to achieve an appropriate model illustrating both **'the structure of the study'** and **'the structure of the research process'**, indicating both its **'form'** and its **'content'**.

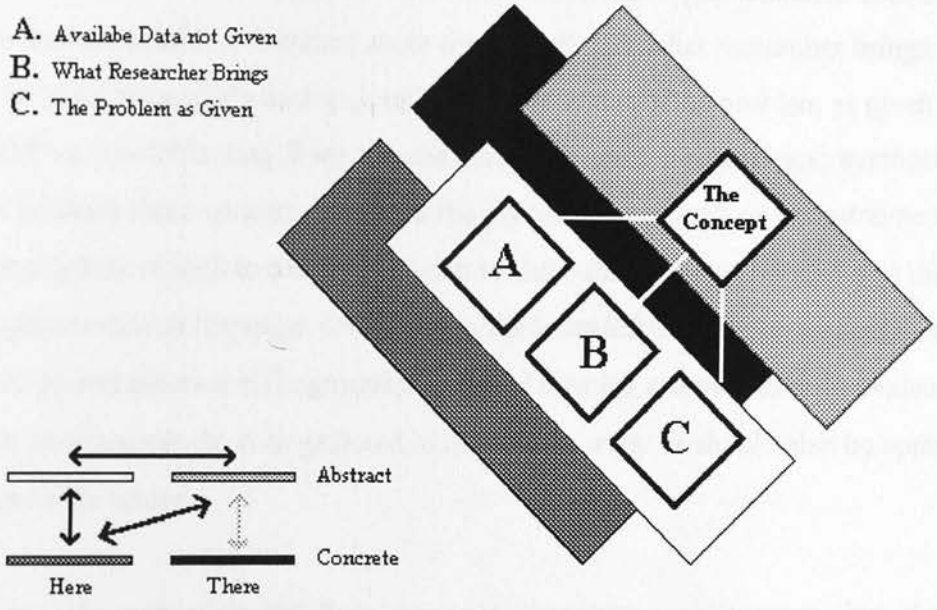

Figure (7) A Model Illustrating both the Structure of the study and the Structure of Research Process (Source: The Author)

The model is consisted of two dichotomies: (1) the 'abstract'-'concrete' ('fluid'-'consolidated') dichotomy representing the two parts of the study - Part One the 'theoretical approach', and Part Two the 'case study'; and (2) the 'here'-'there' dichotomy representing: first an inductive[7]

[7] Bax (1989) believes that inductive processes result in models and deductive processes result in plans and descriptions. Description can be anything which represent attempts to make various experiences communicable. Analysts tend to use the word 'model' rather than 'description' when they want to indicate that the description has been prepared in a careful 'quality controlled' way rather than by informal verbal description, though the distinction is far from absolute. Whether they are systemic or not, description and modelling always involve simplification, because we have to simplify in order to communicate.

flow of the theoretical approach from 'here' (A, B, C - 'Hypothetical Resources') to 'there' ('The New Concept' - The Hypothetical Model) in 'abstract' level; and second again an inductive flow of reviewing case study from 'here' ('Researcher's Evaluation of the Real Situation', and also 'Peoples' Attitudes to Real Situation' - 'Hypothetical Resources') in 'concrete' level to 'there' ('Constructing Peoples' Responses' - Evaluation of the Hypothetical Model) again in 'abstract' level (see Figure 7).

Therefore, the model shows that the research is involved with both levels of focus: abstract and concrete. In abstract level there are three area of concerns: (A) 'available data but not given in the theoretical field' or 'literature about the subject', (B) 'what researcher brings as her field experience' or 'researcher's background knowledge' and (C) 'the problem as given in the ground field' or 'available data from the case study'. Hence, the analysis, synthesis and evaluation of these three concerns will lead the process of research to an outcome which should be appropriate enough to correspond again to these three areas: contribute to the field as an appropriate research language; contribute to the knowledge of the researcher; and also contribute to the real situation in the ground, capable of creating criteria either to evaluate the real situation or to analyse the data gathered in the social survey. It should also be applicable and relevant in the future.

The structure of the study might start from 'abstract' to 'concrete' or the reverse, but, the flow of the research should start from both 'abstract' and 'concrete' having all A, B, and C (in Figure 7) passing through Part One to extend Part two. The research strategy in Part One is adopted to have descriptive, explanatory and simulative approaches of the meaning of centrality in the structure of built environment. It so gains some details of the concept leading to a general theoretical framework of attitudes. Therefore, Chapter (4), as the focus of the study, attempts to induce the hypothetical model of centrality in the process of producing the built environment. It analyses the archetype of the structural transformation of society and space in time. It is assisted by the general framework of the research, which traces its roots from comparative debates on 'system' and 'structure' from teleological and epistemological points of view. It describes specific developments in scientific thinking by overviewing briefly major changes in how scientists have approached their subject matter over the years.

There are three constraints to this end: (1) the problem or the necessity of the topic; (2) the topic itself which is searching for a concept in the environment; (3) the nature of the study which is not problem oriented. Of course, it is conceivable to propound that the literature about the subject, the researcher's background knowledge, and the available data from the field study are the three main hypothetical resources of the study (A, B, and C in Figure 6). But, the proportion of using them depends more on the constraints mentioned above. Therefore, the study describes for those who may prescribe. By this objective, the focus will be on the models extracted by inducing the hypothetical resources rather than focusing on survey and deducing the hypothesis (see Appendix 1 on inductive and hypothetic-deductive routes to scientific explanation). Selecting the supportive case study is for this purpose.

Finally, the theoretical journey, for want of a better term, by which the author approaches and explores the subject of centrality as a paradigm appropriate to the understanding of city centres is developed from the author's own experience, background knowledge and world view and refined to respond to the theme of this work. Beyond the specicfics of this work, however, this theoretical approach offers some range of benefits. It offers to the reader a new attitude and way of understanding any situation. With this new attitude, the reader can develop theories in his and her field, even though it may not be directly specific to or even associated with the subject of this work. This journey is an evolution of the structures by which people express, argue and pursue philosophical ideas and thus makes a positive contribution to the evolution of human understanding within and beyond urban theory.

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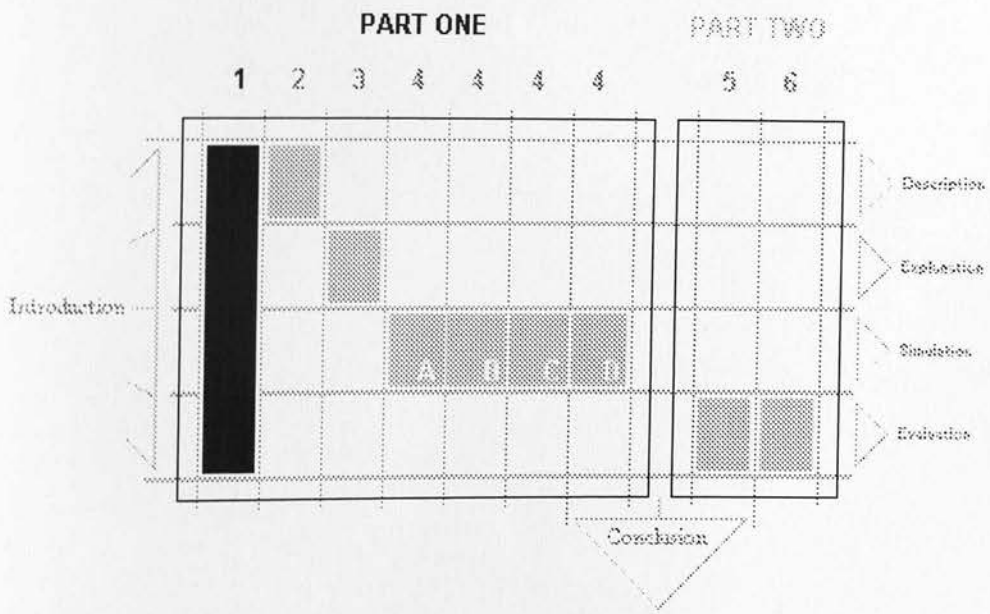
PART ONE

THEORETICAL APPROACH

CHAPTER ONE

SOURCE OF CONCERN



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SOURCE OF CONCERN

relationships. If there are two people, there are two pairwise relations - *a*'s relation with *b*, and *b*'s relation with *a*, which may not be quite the same. If there are ten people each individual has nine others to know, so there are $10 \times 9 = 90$ relations; if there are fifty people, there are $50 \times 49 = 2{,}450$ relations and so on. The relations of this sort go up as the square of the number of elements in a system.

The increase in the complexity of relations may seem alarming enough, but it is slight in comparison with what happens when we consider combinations of *instructions* instead of *relations* between things. For instance, there are only a small number of rules for moves which can be made in chess, but the number of different positions of the pieces of the board which can result when these few rules are carried out alternately by two players is truly immense.

In the same vein, Waddington describes the limitation of the capacity of the human brain in dealing with the complex world. He mentions that without the assistance of *symbolic concepts,* man would be reduced either to taking decisions in the light only of seven or eight particular facts, or to turning the whole thing over to a computer. That, of course, he would have had to programme without the aid of appropriate general concepts.

From other hand, it is argued by Ackoff (1974) that the complex world an individual selects for dealing and the way he formulates its problems depends more on his philosophy and world view than on his science and technology. And the way he goes about solving them depends more on his science and technology than his world view. But again, his ability to use science and technology effectively also depends on his philosophy and world view. He continues that these, in turn, depend on the *symbolic concepts* and ideas he uses and how he uses them to organize his perceptions of the world: "Fundamental changes in these organizing concepts and ideas and the way they are used move societies from one age to another." Therefore, before going further it is good to start by considering the two great philosophical alternatives which are concerned with the kind of intellectual picture we have of the world of nature.

1.1.1. Philosophy for Sense - Natural Philosophies: Things and Processes

The essential function of a philosophy is to provide a mental machinery for dealing with a

large variety of things and concepts and interpreting them into something which has 'meaning', interpreting chaos into sense. One natural philosophy is that the world essentially consists of *things*, and that *any changes we notice are really secondary, arising from the way things interact with one another*. The alternative is that the world consists of *process*, and that *the things we discern are only stills out of what is essentially a movie*.

These alternatives go back to the earliest Greek philosophers who lived before Socrates (about 600-500 BC). Waddington (1977) mentions the 'things' view is usually associated with the name of Democritus, who actually used the word 'atom' as the name for the basic things - invisibly small unchangeable and unchanging little lumps of something which could be called matter. The classical spokesman for the other view was Heraclitus, who argued that it is an essential feature of things that they are always in the process of change, like a flame into which burnable substances pass, are burnt, and hot gases come out. You can never step into the same river twice, said Heraclitus, for the water is flowing, and when you step into it again tomorrow it will not be the same water as it was when you stepped in today.

The Democritean 'things' view, as Waddington (1977) says: "is the most usual in present-day common sense" (p. 18). It is explained that a great many of the things we have to deal with do not change their nature much over the period of time with which we are concerned with them. The sun, the moon, the earth and its rocks, do, of course, undergo changes, and when pressed everyone will admit it. But the changes are so slow that for most purposes it is alright to forget them. Again, at the other end of the scale of size, the chemical atoms of iron, carbon, oxygen, sodium and the rest, with which the chemist deals, will not change in their essential nature within any period of time we are normally concerned with. It seems much simpler to regard them not as processes but as things, and to get down to the practical problem of finding out how these things interact with one another, to bring about the essentially secondary processes of chemical reaction.

There are, therefore, many contexts in which the 'things' view is the sensible one to adopt. But it is in an intermediate range of subjects, between astronomy and geology on the one hand, and chemistry and physics on the other, that the weaknesses of the 'thing' view become

apparent; and from many points of view it is just this intermediate range that is the most interesting. If one considers a living creature, for instance, one can take a 'thing' view, and regard it as a set of chemical and physical interactions going on between essentially unchanging things, namely the chemical substances out of which it is built. But this attitude seems less satisfying when applied to a living system than it does when used, for instance, in connection with an industrial plant. Although it may indeed lead us to discover a reasonably good account of how the body works as a machine from minute to minute, taking in food, digesting it, excreting the waste, using the energy of substances it absorbs to carry out various other processes and so on, this does not seem quite enough. In fact, the activities which the body does are usually more interesting in themselves than an account of the nature of the chemical substances used to do them. We are more interested in the fact that muscles can contract to bring about bodily movement than we are in the chemistry by which the contraction is produced. Again, to take another example, not this time from a living system, it is much more interesting to find out what a computer can do than to know what it is made of - whether it is copper, silver, glass, plastic or compounds of silicon . The 'things' view may be useful to the practical engineer, but does not seem to lead at all directly to the subjects which are of most general interest.

Again, concentrating on the 'thing' aspects of a living system tends to lead one to forget that animals develop; they start as fertilized eggs, go through an elaborate process of developing into an adult form, which usually lasts a reasonably long time, but which is all the while undergoing slow changes, which will lead eventually to old age and death. The whole-hearted adoption of the 'thing' view is a temptation to forget these sorts of change, and to concentrate mainly on finding out how adult bodies work, as though they were no more involved in developmental or evolutionary changes than are automobiles.

During most of this century, the conventional wisdom of the dominant group about the nature of living organisms has been a rather exaggerated form of the 'thing' view. It argues that the world and everything in it is constituted from arrangements of essentially unchanging material particles, whose nature has already been largely, if not entirely, discovered by the researches of physics and chemistry. These physico-chemical entities are supposed to constitute the

whole of objective reality.

In the early years of the century, this view, when applied to living things, was known as *'mechanism'* (Waddington, 1977). The human being was regarded as a very complicated machine, built up of these physico-chemical parts. A few rather eccentric biologists pointed out that there are many properties of living things, such as their development, their evolution, their apparent organization and particularly their consciousness, which are difficult or impossible to explain in terms of arrangements of material particles as those are usually defined by physics and chemistry. It was sometimes claimed that living things must involve some other type of principle, a 'vital force' of some kind. The adherents of this view, known as *'vitalism'* were however not able to explain the nature of this force in any terms in which it could be reconciled with the rest of human knowledge.

The great advances in understanding of living things during the first half of this century is evidence of how effectively the 'thing', mechanistic, view can work as a practical recipe for investigating biological processes. It has led to an enormous increase in understanding how the body works as a physiological machine, with all the repercussion of that knowledge on medicine, and finally to the discovery of the material basis of heredity, and its basis in DNA and the genetic code. But still, powerful though this approach is, it has so far really only been successful in connection with some of the questions we want to ask about living things, not all of them. It has given us little understanding of embryonic development; little except some rather empty theories about evolution; and hardly anything at all about the mind.

One of the earliest groups who tried to think out a new point of view (mainly biologists in the thirties e.g. Needham, Woodger) argued that one should think of living systems as made up of the physico-chemical entities, *plus* what they called *'organizing relations'* between them. These organizing relations were thought of as complicated networks of interactions, comparable to what would nowadays be called *'cybernetic relations'*, although that word had not been invented at the time (Waddington, 1977).

Here, therefore, the main theme to emphasize is the difference between two alternative

natural philosophies that in 'things' view changes are secondary, arising from the *interaction of elements*, whereas in 'process' view changes are elementary, organizing the *relations between elements* (Figure 1.1). **Hence, the complexity is questioned in relation to find out the emergence of these organizing centres which change the relation between parts rather than focusing on how parts interact to each other to create secondary changes.**

Things View:
Changes are Secondary, Arising from the 'Interaction of Elements'

Process View:
Changes are Elementary, Organising the 'Relations between Elements'

Figure (1.1) The Difference between Things and Process Views (Source: The Author)

In the last thirty or forty years, there has indeed been progress in understanding the nature of the networks of interaction which are involved in the processes by which a collection cells becomes organized into an organ with a unitary character, or into a neural system capable of functioning in a coherent way (see Chapter 4 on living organism systems). As a development of this approach, some biologists spoke of a *process of 'emergence' of new properties at certain 'levels of complexity'*. By this they meant that: "when a mechanism, made up out of material physico-chemical parts, becomes complicated enough, it might exhibit a type of behaviour which did not and could not occur at all in the isolated parts" (Waddington, 1977, p. 21). To give a crude example: when the engine, propeller, wings, fuselage, landing gear, and so on are put together in the right way, the complicated set-up becomes an aircraft which can fly; but none of the parts can fly when isolated. It was hoped in this way to account for the fact that although man, at least, has self-consciousness, his ultimate constituents - if one takes them to be physico-chemical atoms and molecules - do not have anything of that kind at all.

The ideas of the importance of organizing relations between the basic entities, and of the possibility of the emergence of novel properties in systems which are complicated enough, are nowadays probably the main rival to the 'nothing but material things'

philosophy. However, Waddington argues the author who developed a similar line of thought more thoroughly, and much more in relation to the natural world as a whole and our knowledge of it, was A. N. Whitehead.

The basic of his view can be regarded as a return to what people had thought about science, as a means of understanding nature, in its very earliest days. It argues that the foundation of knowledge is not the atom, as chemists describe it, or whatever fundamental particles the most recent physicists are willing to admit. Instead science is based on observations, which, made in a controlled and organised way, amount to experiments. Now an observation, or an experiment, has to be observed by someone. "It is 'an occasion of experience'; and involves the experiencing person as well as what is experienced. Thus phenomena like mind, or conscious 'perception' and 'conception', are included in the very foundation of knowledge" (Waddington, 1977, p. 22).

It introduces, again, that it is the elementary organised relations between parts, involved in the experience and organised by the mind of the experiencing person, which create the basic of the knowlege itself and not the parts themselves; and it is the changing relation between these parts by the mind which improve the degree of the knowledge or visa versa.

This refers to the point that it is important to see:

(1) **the nature of complexity not only in relation to the number of parts involved in the experience, but also to the nature of relations the parts have or in fact to the degree of complexity the parts are interrelated**; and

(2) **this complexity is also applied to the human mind organism which has an elemetary organised authority to create organised relatations between parts, events and concepts which are experienced in everyday knowledge practice** (see Chapter 4 on purposeful ideal seeking systems).

This firstly opens up the authority of the organised order of the relations between parts in *the process of 'emergence' of new properties at certain 'levels of the complexity'* in relation to the natural world as a whole. And secondly opens up the authority of the knowledge of the human mind which organises (realizes) the relations between parts of that whole as his knowledge of it.

Waddington argues that the controversy between vitalism and mechanism, and the development of the minority view of the importance of organizing relations and emergence, was largely an European phenomenon during the thirties and forties. The Americans became interested in the subject considerably around the sixties, and they tend to use in this connection the word 'reductionism'. One might think at first sight that this would indicate the view that one should start from the observation or experiment, and attempt to reduce its complexity to terms of the simpler entities which one has already come across in physics and chemistry; which is just what the most radical anti 'thing' view would maintain. However, in American practice, the word is used in exactly the opposite sense to this. 'Reductionism' implies two rather different things. As a philosophy it means that the objective world consists of physico-chemical entities and explicitly describable interactions between them. This is the view that we have above designated as majority 'thing' view. Secondary, reductionism is a recipe for action: then it is the belief that if you are confronted with a complex situation, for instance a living system, your best bet to get some sort of pay-off or other is to look for the physical or chemical factors which can influence the phenomenon in question.

As an expression of Waddington's opinion, he says that "reductionism is lousy philosophy (because science is based on experiment, not on atom), but is a good recipe for making a quick (scientific) buck by discovering some useful practical information; but is bad again as a method for making major advances in human comprehension" (pp. 23-24).

Hence, it is again the process of experience which is the main subject to investigate how the order of organization and changes emerges in the first place rather than the information itself which interact with each other to create the changes in the second place.

There are two points worth adding about Whitehead. In the earlier stages of his thought, Waddington (1977) points out, he coined two phrases. The first is the 'Bifurcation of Nature'; by which he meant the idea that it is possible to split nature into two separate parts, mind on the one hand, and matter on the other. This theme is particularly associated with the name of Descartes, and is also known as the Cartesian dualism. Whitehead maintained, in opposition to this, that primitively we get to know about the world by a process which involves minds, which operate by means of our bodily material structures, interacting with external events. He claimed that an attempt to make a clean-cut break, between the subjective mental observer and the objective material observed, is a basic error. They are initially parts of a whole, and if one wants for some purposes to separate them, that can only be a matter of convenience that should be indulged in with great caution.

This is to emphasize on holistic view of the complexity which involves both matter and mind, and also both number of parts and nature of relations between parts in actual occasions of human experience (see Chapter 4 on the process of thought).

The second of Whitehead's phrases is the 'Fallacy of Misplaced Concreteness'. Most conventional thought, he argues, recognizes certain derived, and essentially abstract, notions, that have been invented by man to try to make sense of the situations he comes across. Examples are physical atoms, or feelings such as anger, or social notions such as justice. Man tends to accept these notions as being concrete things, which could, as it were, be picked up and placed somewhere else. Whitehead argues that such notions are in fact always *derived* from actual occasions of human experience. **The experiences are the real things**; **the notions are secondary and derivative** (see Chapter 4 on the process of thought/concrete and abstract systems). It is dangerous to forget this, and to take these secondary things as more concrete and real than they actually are. This is, of course, just another, but an illuminating way, of putting the argument against reductionism as a philosophy. If we accept that the universe contains things which are independent of our personal selves - then it is a fallacy to suppose that our present descriptions of these independent factors sum up the whole of their concrete reality, leaving nothing out. 'Atoms are real.' But what sort of atoms? All we know about them is what we have so far succeeded in finding out, by analysing our experiences, and

arranging to have experiences (experiments) which look like being informative (see Chapter 4 on purposeful ideal seeking processe/formulation and evaluation of choices in abstract systems). The Fallacy of Misplaced Concreteness is to suppose that what we have so far discovered is the *whole* of what is contained in the reality independent of ourselves. As Purce (1974) explains:

> "It has been man's tendency to forget, in his enthusiasm for objective knowledge, that, ultimately, subject and object are one, and merely opposite ends of the same axis. The consequence of this has been a swing back to a recognition of their identity, as expressed in the acknowledgment by the observational scientists of 'complementarity': light is both particle and wave, depending on the mode of one's participation in its being. In other words, the method of observation (that is, the nature of the observer) changes the apparently fundamental nature of light, and is not, therefore, totally distinct or apart from it."

This also refers to the interrelation and interdependence of 'concrete' and 'abstract' systems in that they are always tied together and cannot be analysed individually without the presence and assistance of the other. This again expresses the nature of complexity of the subject which is investigated and shows how far it should be included (see Chapter 4 on the process of space). **This is an emphasis on the nature of 'process' view which indicates the interrelation of all members or parts in the process of emergence of organisational order both in concrete and abstract levels over time.**

1.1.2. Tools for Thought - Theoretical Concepts

Returning to the complexity of natural world, now it is time to see how human mind can overcome to these complexities. Man's attempts to deal with complex situations have to be carried out within the limitations of his brain. These limitations are rather severe. Even in well-trained people, the human nervous system can process information only at the rate of 250-1,000 words per minute (Waddington, 1977) (in comparison, electronic equipment, using such methods as CD Rom, can store and retrieve up to 700,000 words per minute; and this rate is being rapidly increased). The number of items man can also consider simultaneously is tiny.

For example, if he is subject to a number of incoming stimuli to his various sense organs, in general he can discriminate and recognize only about seven or eight at once. Again, this is about the number of items that a man can simultaneously bring to mind, out of all those stored in his memory, and take into consideration at one and the same time when coming to a decision about something. This is a remarkably small 'channel capacity', to use the electrical engineers' term.

Waddington defines these simultaneous items and says that these seven or eight ideas, that can be brought into immediate consciousness, need not be items of specific detailed information. Some of them may be complex ideas or theories synthesizing into a single concept a mass of minute details. Many formation in nature, although both constituted and caused by dissimilar phenomena, are not only similar to look at, but have identical mathematical descriptions. This would suggest that together they form a higher overall order outside that limited by our concept of situation.

The process of formulating theoretical concepts (such as atom, gene, Hamlet and the like) is the only device that man has at his disposal to help him deal with the highly complex world. When we call a common name such as Tom it is just a name, but when we call the name 'Hamlet' it brings us the whole story of it and the whole message of the story. This also happens to such a symbolic concepts as 'atom' and 'gene'. This is the essential justification for the pursuit of pure science, high-brow literature and art. Without the assistance of the symbolic concepts formulated by these apparently luxury activities, man would be reduced either to taking decisions in the light only of seven or eight particular facts, or to turning the whole thing over to a computer. This is the reason for the assistance of symbolic concepts. As Ackoff (1974) also indicates philosophies and world views depend on the *concepts* and ideas man uses and how he uses them to organize his perceptions of the world: "... that fundamental changes in these organizing concepts and ideas and the way they are used move societies from one age to another." **This is therefore the important role of these concepts that the study is looking for the concept of centrality following some concern to the nature of complexity**.

Of course it is impossible to get anything like a complete or accurate picture of the complexity of the world, which man has to try to handle with these somewhat imperfect instruments. However, one can get some idea of at least part of the problem by considering studies which have been made of the growth of information in the history of human life. Even this can be estimated only indirectly, by figures which give indications of trends rather than anything more precise. The effect of the mass of information is that it encourages specialization, and the development of theoretical insight makes it possible to sum up large masses of information under the heading of a single concept. Nevertheless, the narrowing of range must be quite considerable. Attempts to overcome the difficulty by inter-disciplinary or trans-disciplinary is best considered as the production of a different mix of interests which seems particularly relevant to important problems of the time, rather than the task of adding one more piece of information to previous ones under the heading of the subject. **This is also a reason for this study which looks for different disciplines such as sociology and biology to somehow reformulate the concept of centrality in highly urban complexity**. Purce (1975) says:

> "The steepness of the straight path is prohibitive for most of us. The mystic calls this the 'short cut', the Path of Illumination; but that which lights the mystic's way blinds the ordinary man, unprepared for the light of full knowledge. For him, unveiled truth is death; instead he must make his gradual ascent, allowing himself the protecting reassurance of its gentle windings" (p. 7).

1.2. Centrality

'Tools for thought', hence, is a common need for the ways of perceiving and thinking about the world and its complexity. The process of formulating the theoretical concept of 'centre and centrality' is one of those. Because the scale of very many of the impacts of mankind on the world surrounding him is so great that they go right below the surface of things, there is a need for further elaboration on this concept. At the deeper level, we find that most aspects of life and its interactions with its surroundings are interconnected into complexity. No powerful action can be expected to have only one consequence, confined to the thing it was primarily directed at. It is almost bound to affect lots of other things as well.

There is a need nowadays to be able to think not just about simple systems but about complex ones. According to the concept of centrality applied in urban design many suggestions have been made of different ways of trying to do this. This study is an attempt to bring together some of these proposed ideas about the concept of centrality: (1) **many have been originally put forward accompanied by a decoration of 'complexity of urban forms'** (see Chapter 2); **and** (2) **some have been due to the genuine difficulty of finding ways of formulating 'the structure of complex urban systems'. But, the question is what kind of structure they are looking for? The structure of systems in which, although things are going on, the system itself remains the same as time passes** (see Chapter 3), **or systems which alter with the lapes of time in the process of change over time** (see Chapter 4)? **The study proposes that it is now time that it might make the idea of centrality more profound in searching 'the process of change in the structure of complex urban systems over time'**.

There is a doubt if there has ever been a period in history when a greater proportion of designers have found themselves frankly puzzled by the way the environment reacts to their best efforts to change it, if possible for the better. As Waddington argues:

> "Designers knock down some dilapidated slums and put up reasonably smart new buildings in their place, only to find a few years later that the inhabitants of the area are just as badly off and living in as great squalor as before.... If things go unexpectedly wrong once or twice, that is, one might say rather paradoxically, only to be expected; but recently they seem to have been going wrong so often and in so many different contexts, that many designers are beginning to feel that they must be thinking in some wrong way about how the environment works" (p. xi).

It is believed that this suspicion is correct. The ways of looking at things that we have in the past accepted as common sense really do not work under all circumstances, and it is very likely that we have reached a period of history when they do not match the type of processes which are going on in the world at large. Waddington further explains:

"We have been trained to think, or have accepted as common sense, that what goes on around us can usually be understood as some set of simple causal sequences in which , for instance, *a* causes *b* and *b* then causes *c*, then *c* causes *d* and so on. This is only good enough when *a* causes *b* but has very little other effect on anything else, and similarly the overmingly most important effect of *b* is to cause *c*. Many of our own individual actions still have this character. That is really because they are in some ways relatively feeble compared to the whole mass of things and processes of which they are a part" (p. xi).

He believes the change which has occurred, or is occurring now, is that the effects of human societies on their surroundings are now so powerful that it is no longer adequate to concentrate on the primary effects and neglect all secondary influences.

But, this is because of the fact that as mentioned before the nature of complexity calls for looking both to the number of parts and to the nature of organised relations between parts (see Chapter 4). **It is assumed now that in *the process of 'emergence' of new properties at certain 'levels of complexity'* changes are *elmentary* organised by interaction between parts. One simple change in one part effects many changes in the other parts. Or, talking in another way, one simple change in one part causes reorganisational process in the other parts. That is why we cannot neglect the secondary influences: not because of the scale of the changes which is huge, but also because of the level of the complexity which involves the reorganisational process as well. The idea looks at the changes to emphasize that not only they come from the previous organizational order but also they do affect the coming reorganizal order as well. It defines how important it is to see both *changes* and the *operation of the system after changes* which continuously alters with the lapse of time.**

Back to centrality, the simplest examples of complex *things* which one comes across in urban complexity are 'complex forms'; in them, nothing is changing, and nothing is engaged in active interaction with anything else (see Chapter 2). **This defines that alternative of the concept of centrality which *individuates* the shape or the form of a**

system[1]. **But a form or a shape, however complex, can only be a 'description of an appearance'; and to begin to *understand* a thing or a system, we have to 'explain its structure', either what has produced this structure or what its function is** (see 1.3.1.1. on difference between discriptive images and the explanatory concept): (1) **sometimes considering the structure of systems in which, although things are going on, the system itself remains the same as time passes (i.e. non-living sytems)**[2] (see Chapter 3); **and** (2) **sometimes, as it is the main objective of this study, considering the structure of systems which alter with the lapse of time (i.e. living sytems), looking for the structure of changes or the operation of structure in living complex systems**[3] (see Chapter 4). As Waddington (1977) explains:

> "Time is of fundamental importance in two ways. For one thing, it is an essential part of reality. Everything real lasts some length of time, changing more, less or inappreciably, as time passes. An instantaneous moment is an abstract notion, sometimes useful but never real. As Whitehead remarked, the present is really the fringe of memory tinged with anticipation. Then, ... any attempt to influence the world has to act on the processes which are going on. Temporal change is the basic medium of all activity, including our own" (P. 64).

For both these reasons, an understanding merely of the structure of a complex system

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[1] Physical, geometrical or morphological properties - Structural properties

[2] Perhaps the simplest kind of structure a complex system can have is a hierarchical chain of comand, such as one finds in an army with its general at the top down to the common soldier. This is, of course, a very simple type of organized structure, and when we are dealing with an organization of human relationships based on this principle it is usually quite easy to discover which level of the hierarchy any person belongs to. But he may belong to different levels in different hierarchies. Someone who is a private soldier in an army may at the same time be a member of parliament, or a priest in an organized church, and therefore occupy much higher levels in those hierarchies. Another example of this kind is the hierarchical organization of urban networks which gradually lead to the centres. - Functional properties of systems, in which the system itself remains the same as time passes.

[3] Here the concern is how the structure of changes functions as time passes. That kind of structure which has authority to hold the whole process in a certain way. Animals, pants, human societies, ecosystems and all open systems always recieve inputs of food or other sources of energy, and raw materials of various kinds; and produce various kinds of wastes and artefacts. The question is how the structure of this kind holds the process of life itself.

is not enough; we must try to understand it as an inter-related set of *processes*.

Why 'centre and centrality'? The choice of this theme may well be a sign of the times. In an era of rapid change in socio-spatial systems, social science and spatial design both look for new tools of analysis, and for systems of relationships that would be endowed with permanent value and that would provide a better understanding of the dynamic evolution affecting many of the spatial patterns with which the social process is concerned. The time seems ripe indeed for the two disciplines to work together. This study uses the concept of centrality in exchanging and integrating the knowledge and approaches of both spatial designers and social scientists. However, it is not intended to cover here all the aspects that a full examination of the concept may involve. But, it is hoped to provide an instrument for further study and analysis of this concept.

1.2.1. Some 'Inductive' or 'Formulative' Conjectures on Centrality

Actually for the author the need for this debate started with the following **'inductive'** conjectures on centrality as a part of a study course run by Dr Bahraini in 1992, who is a lecturer in the School of Planning and Urban Design in the University of Tehran/Iran. It starts with the notion that in the world around us any phenomenon in order to be imagined must conform to a pattern, so, it will be understandable, measurable, comparable and predictable. That all phenomena have pattern: macrocosm or microcosm, organic or nonorganic. They are regular repetition of shape either static or dynamic. Some examples are:

The planets' rotation pattern;
The waves' diffusion patterns;
The chemical reaction's patterns; ... and the like.

The properties of these patterns create some available possibilities, such as:

Understanding	→	Recognition
Measuring	→	Analysis
Comparing	→	Memory
Predicting	→	Forecast, ... and so on.

Patterns separate each unknown complexity into a significant one. Sometimes there is no function for patterns but man is interested in them by nature. Eyes follow order and regularity, because it is more understandable and more measurable. We discover patterns from nature. Considering the central point is one of them. It causes special regularity, sometimes as *the start point of properties* and sometimes as *the end point of properties*. Centre is somewhere where resultant forces are zero, so it is *the balance point* or *the static state point* of properties (Figure 1.2).

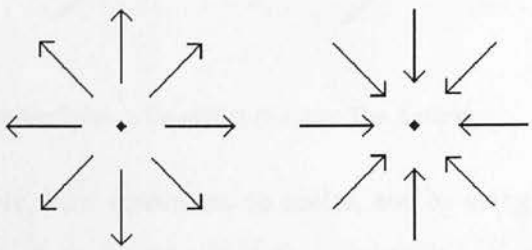

Figure (1.2) Centre as the Start Point or as the End Point of Properties (Source: The Author)

The most important property of centrality is that any limited phenomenon in nature has a 'start point', an 'influence domain' and an 'ending point'. Its property finishes somewhere, a parting line where there is one property on one side and another property on the other side. So, it represents *the contrast of properties* or *the contrast of domains* (Figure 1.3).

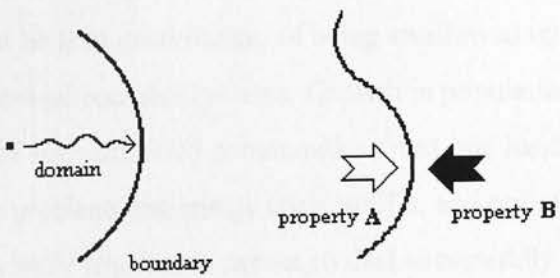

Figure (1.3) Contrast of Properties or Contrast of Domains (Source: The Author)

Domains are reduced by *hierarchy of properties*. They interfere with each other in space and work together collectively. Centrality separates them into *familiar* and *strange* parts. Difference between two phenomena is the possibility of their identification, otherwise

everything or every place would be alike. We could not reproduce them if we were not able to divide them to those parts, because property would be unchangeable (Figure 1.4).

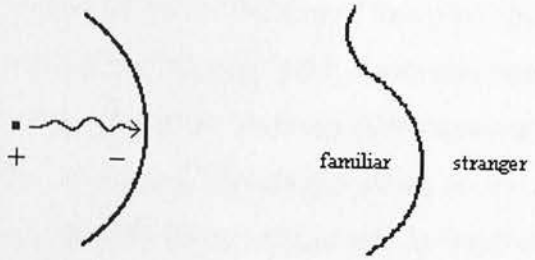

Figure (1.4) Hierarchy of Properties and Familiar/Strange Properties (Source: The Author)

Contrast creates *direction*: far and near, from centre and to centre, and by using that we can build a memory imagination of any phenomenon. Therefore, centrality creates security, because it builds familiar domain. Boundary is a representative of non-continuing: a line, or a surface which specifies a special confined. It is possibility of *variety*, *multiplicity*, *comparison, selection*, *searching*, *existing* and the like.

1.2.2. Centrality and Cities

Many complex systems exist in the world for which tools of these kinds i.e. centrality may be useful. Their particular importance in this time in history, and the reason that they are being developed now although they have been so neglected in the past, is that mankind is quite suddenly coming to the realization that he is in great danger of being swallowed up by what might be called the complex system to end all complex systems. Growth in population, global interdependence and disappearance of self contained communities from one hand and the environment problems, the urbanization problems, the energy crisis, traffic, and pollution from other hand all are complex enough. It is really hopeless to expect to deal successfully with any one of these complex problems in its own. Even if we had already attained much greater skill in handling these tools for thought about complex problems than we have in fact developed up to the present, what we are really confronting is a *complex* of *complexes*[4]. It is for this reason that the development of adequate tools of thought about complex systems is so

[4] Throughout the thesis the word complexes has been used as the plular noun of the word complex.

overwhelmingly important.

The thesis is a study about the concept of centrality, and cities are the most obtrusive by-products of that concept on the surface of the earth. The idea of centrality came before cities and has taken on different forms within the modern metropolis. 'Centrality' is more basic than urbanism, urbanization, or whatever word is used to cover city formation and development - more basic and perhaps even more complicated. The complications are entwined within a progression from the straightforward idea of transport efficiencies to complex symbolism in psychology.

1.2.3. Towards Centrality

To man centre is the first point which he has felt. It has been a natural need and has had religious roots. From a *cosmological* point of view it is the manifestation of the centre of life. In primitive civilizations, celebration of religious customs around a long piece of wood is one of its evidences. In Christianity, we read: "*We all circled round him and responded to him: Amen...*" (Purce, 1975, p. 31). Also in Islam, the winding upwards to the peak of full understanding in the seven-fold path of the Muslem round the Ka'aba is another example (Purce, 1975, p. 31). In Buddhism and Hindus is also the same story (see Chapter 2).

Man as a social creature feels happy and secure in his society, in his group, and in his family, and has a sense of belonging to these centres. In adaptation with environment he also has a socially unique culture with special values which has a central role in his life (see Chapter 2). Also in relation to egocentrism it is said by Laponce (1987): "The model to which we are led by egocentrism, the model that imprints the perceptions of the young child (Piaget, 1956), is then used, over and over again, to make senses of what we are and where we are and what we see and what we value - whether we value it more or less or like ourselves."

From a *psychological* point of view, people conceive their space and determine its centre, otherwise they will feel lost especially when the space is very big and they cannot determine it in one vision. If centrality is such a powerful organizer, there are hence purely *psychological* facts in shaping cities fabric. The appearance of cities are based on the first point or the same

centre. As Hall (1966) says: "Being mobile animals with the constant feeling of being surrounded by a bubble of space, we organize what we see, what we hear, what we smell, what we touch, in relation to the centre of that bubble where we perceive ourselves to be."

Centre hasn't been deleted from cities. It has only been changed time to time. There are many examples of centre kinds: symbolic centre, political centre, economic centre, official centre, shopping centre and many others. Not only centre has several meanings in physical character of city but also has many roots in nonphysical aspects of it. These aspects are determinations of relationships. Centre has its own role when all surroundings follow it. Centre unifies, controls, attracts, collects, expands, limits, determines and so on.

1.2.4. Some 'Deductive' or 'Interpretative' Conjectures on Centrality in Cities

It is distinguishable that there are various **'deductive'** conjectures or various interpretations of the meaning of centre and centrality in cities. Some may interpret the centre as:

a) **A start point** to achieve *a spring*. Sometimes centre is the beginning point of a process. The first point of a city expansion from a historical point of view (see Figure 1.5);

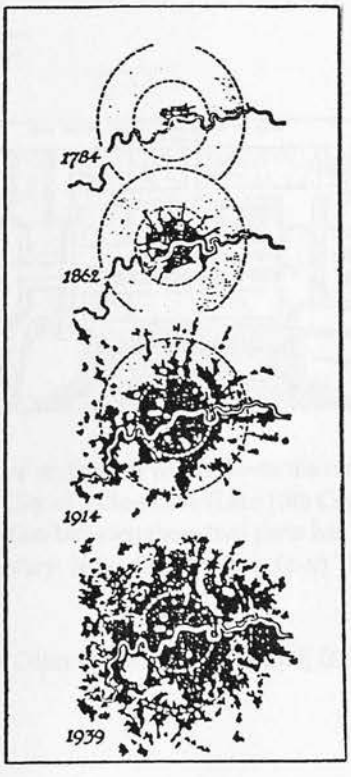

Figure (1.5) London, 1784-1939 (Source: Benevolo, 1968)

b) **An advertence point** to achieve *an indication.* Sometimes centre is the clue point of a process. An important occasion which occurs in the process of a city expansion (see Figures 1.6, 1.7 and 1.8);

Figure (1.6) Nancy (1645) before Unification, The Old Medieval City in the Right and the New Renaissance City of Ville-neuve in the Left. Each part has its own defence system.. (Source: Morris, 1974)

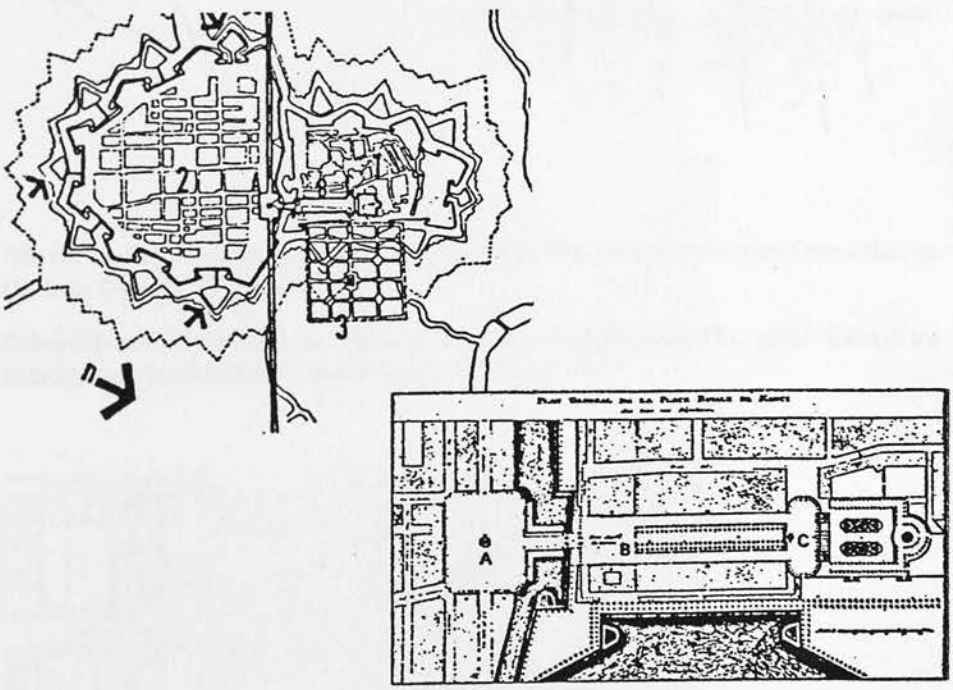

Figure (1.7) Above: The general plan of Nancy (18th Century) after unification which shows the renovation part of the city to connect (2) the New Renaissance City of Ville-neuve (Late 16th Century) to (1) the Medieval Old City in the right. The connection between these two parts has been an advertence point in the process of Nancy in 18th century. Note: (3) The Park, (x-x) The Main New Transit Axis

Figure (1.8) Below: Nancy, Detailed Plan of Place Royal and its Connections: A. Place Royal, B. Place de La Carriere, C. Hamicycle (Source: Morris, 1974)

c) **A base point** to achieve *an expansion* in the process of *growth.* Centre may be considered as the first point of a growing system. Sometimes, the trunk of a tree or sometimes its roots are the base points of its expansion. As examples of neural network architectures see Figures (1.9) and (1.10). It is also considered that a city centre is the base point of a city expansion (Figure 1.11);

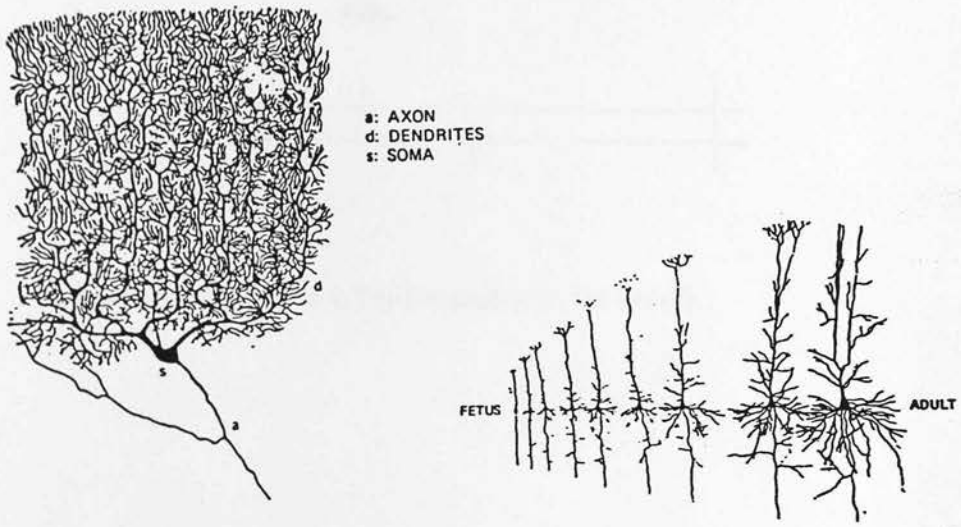

Figure (1.9) Above: Purkinje Cell (from the Cerebellum) with its Dendrites Stained; they form a flat fan. (Source: Dayhoff, 1990, p. 127)

Figure (1.10) Below: Growth of the Dendritic Trees and Axon Branches of Cortical Pyramidal Cells in the Human, from Fetus to Adult (Source: Dayhoff, 1990, p. 131)

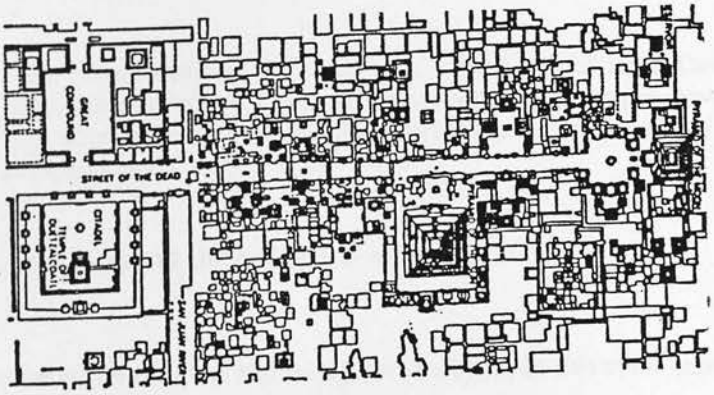

Figure (1.11) The Central Area of Teotihuacan City, 300-400 A.C., Aztecs of Mexico (Source: Morris, 1974), Central Axis as the Main Base for the Growth of the City

d) **A stable point** to achieve *a balance*. This attitude considers the centre as a balancing point of some forces which depend on their sizes and their distances from the centre. We have in physics, that in a balanced situation of two forces, when the two sides are not with the same weight, the fulcrum is achieved to be closer to the heavier side (see Figures 1.12 and 1.13);

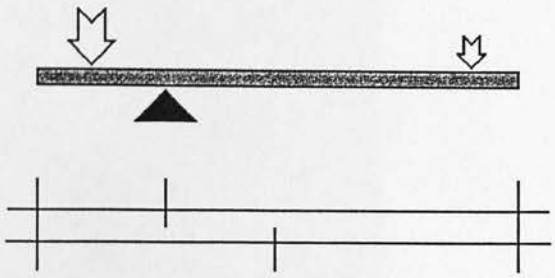

Figure (1.12) Balanced Centre in Respect to Two Forces (Source: The Author)

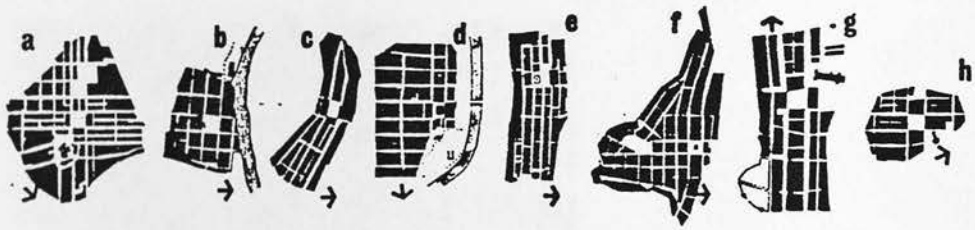

Figure (1.13) Eight French Bastides (13th Century): a. Villreal, b. Lialinde, c. Castillonnes, d. Eymet, e. Villefranche-du-Perigord, f. Domme, g. Beaumont, h. Monflanquin (New Towns of the Middle Age which were built pre-planed) (Source: Morris, 1974), Balanced Centres in Respect to Different Forces

And, also some may interpret the concept of centrality:

a) **Formal** to achieve *composition* and *beauty* of an object. In this view centrality is an artistic principle like other ones, such as: contrast, balance, symmetry, and the like (see Figure 1.14). Centrality is used to define other principles as it is also defined by them in many occasions.

In various hand crafts, central symmetry is based on the whole attention to the centre, the point which explains the space and all components follow it (see Figures 1.14 and 1.15);

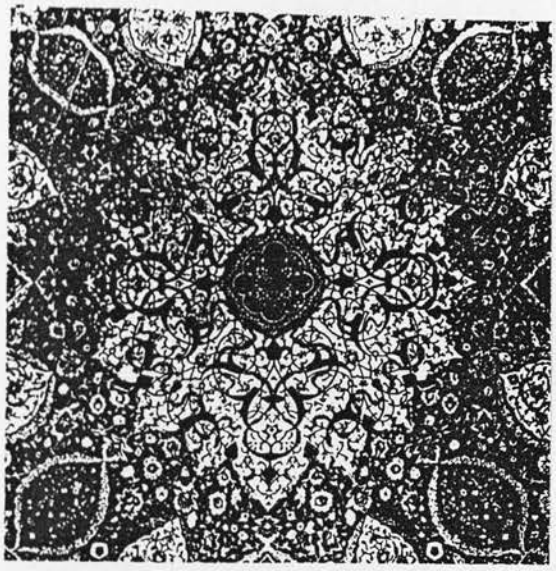

Figure (1.14) Central Symmetry, Iranian Carpet

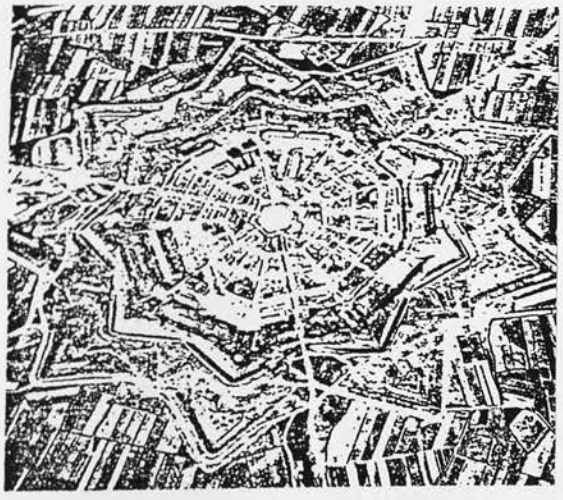

Figure (1.15) Palma Nova, 1593, Renaissance Period (14th-16th Centuries) (Source: Morris, 1974)

b) **Functional** to achieve, for instance, a proper *circulation* in a system. Sometimes, centre is referred as a heart to circulate the properties throughout the system. In this case, its function is more essential and important than its location to compose other parts of the

system: geographically the heart is not necessarily located in the centre of the body, but, its function is central. This function should be good enough in order to circulate a healthy body (see Figure 1.16);

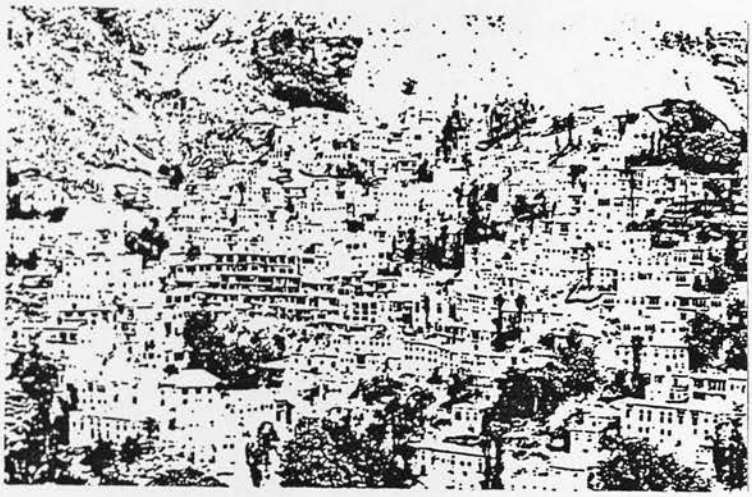

Figure (1.16) Iran: Masuleh (Source: Kiani, 1986, p. 510). Functional centre which circulates the properties throughout the system is not necessarily located in the centre.

c) **Hierarchical** to achieve *selection*. Rating by hierarchical measurement is, for example, a tool by which societies are characterised. These classifications of values show that some of them are in upper levels and some in lower levels. Here centre is the point, from which this criteria emerges (see Figure 1.17);

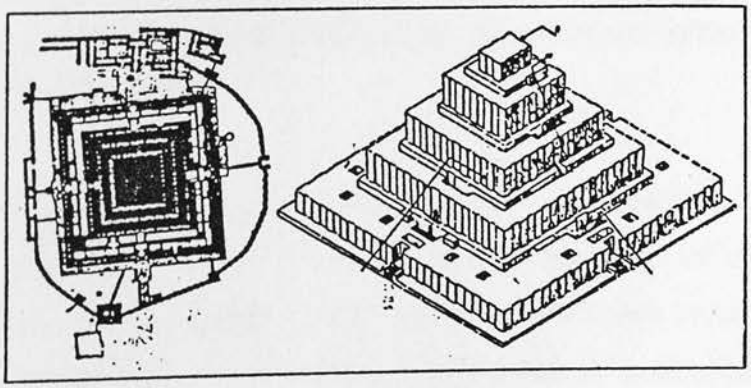

Figure (1.17) Tchoga Zanbil (1250 B.C.) Plan and Isometric, from Ghirshman, *Tchoga Zanbil*, Vol. 1. (Source: Ardalan et al., 1973, p. 85)

d) **Structural** to achieve *evolution* and *development*. It involves the main data information to achieve *organization* in the process of change in time. For example, it is the information embedded in a cell which is the main source of its development in time. **The structural centre of this kind is the origin of an existence, reserving the main data information which is necessary for the process of change over time** (see Figure 1.18).

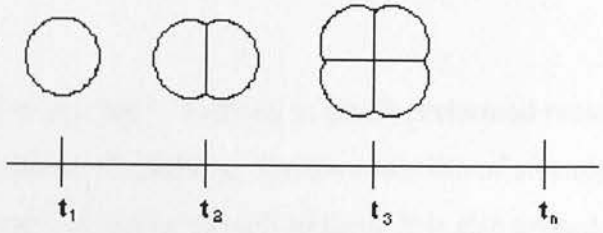

Figure (1.18) The Process of Change Inherited in the Organization of a Cell (Source: The Author)

1.2.5. 'Structural Interpretation' of the Concept of Centrality

According to the structural interpretation of the meaning of centrality, as one of the most essential interpretations of this concept, the author refers to Purce (1974) who states: "The full significance of organization is being demonstrated by the physicists, who say that matter actually consists in its own movement and organization.... This process is built into the structure and is inherent in the natural evolution by repeated breaking down and building up..." (p. 8). It means, the movement creates a centre and a whole which is built into the structure by repeated breaking down and building up. Movement along this way is at once aspiring and centring, concentration is not on static perfection, but on the equilibrium of its essential flow. Purce continues:

> "It both comes from and returns to its source; it is a continuum whose ends are opposite and yet the same; and it demonstrates the cycles of change within the continuum and the alternation of the polarities within each cycle. It embodies the principles of expansion and contraction and the potential for simultaneous movement in either direction towards its two extremities. These extremities, the centre and the whole, flow into each other; essentially, they are interchangeable" (p. 8).

Therefore in his words, the completion is also a beginning, when the seed of its opposite offsets the balance and causes a reversal of direction. This time to go back would be to go against the order of things or the same centre. In the same vein, also Christopher Alexander (1979) explains: "There is a process which brings order out of nothing but ourselves.... It is a central quality which is the root criterion of life and spirit in a man, a town, a building, or a wildness. The search which we make for this quality, in our own lives, is the central search of any person."

He emphasizes that it is not a process of addition, in which preformed parts are combined to create a whole, but is a process of unfolding, like the evolution of an embryo, in which the whole precedes the parts, and actually gives birth to them. It is also argued that the centre is equally, the centre of any place, or the centre of any person or being. As Purce (1974) mentions, in *Greek philosophy*, in the *Upanishads*, in the *Cabbala* and in *Sufism*, the centre within the human being is considered to be the heart, designated respectively the seat of Intelligence, of 'Brahma', of 'Solomon' and of the 'Universal Logos'. As he states:

> "In many philosophies, the centre within the human being is considered to be the heart. Although, physiologically, the heart is the centre of the circulation of the vital fluid throughout the body, the heart in this higher sense is not confined to the corporeal state, and its location should not be exactly identified with that of its physical counterpart.... Each person is therefore a central axis, and has within him a central axis, up which he must move or 'climb' by developing his various centres...." (p. 17).

Also it is said by Guenon (1974): " Just as 'each part of the universe whether it be a world or a particular being is always and everywhere analogous to the whole', so 'every human individual... contains the possibility of making himself the centre in the respect of the total being'."

Therefore, **centre is an *interpreted value point* in various regularized systems** or **centrality is a *definable way* in many regularizing complexes**. As centre and centrality is not an invention but a discovery, man believes and receives it as an abstract value - a symbolic way

to define the complexes. It is imagined in various bases, in different values, and different uses. It is a proper tool to describe, explain, or define the complexes.

In other words, **since any description of a complex must be limited, we are able to reveal it only by using symbols which cut directly through all the layers and windings of our consciousness**: (1) **sometimes via the process of formulating theoretical concepts** (the inductive process of building a concept); and (2) **sometimes via the process of interpreting those theoretical concepts** (the deductive process of applying a concept). As Purce (1974) explains: "The function of symbolism is to go beyond the 'limitation of the fragment' and link the different 'parts' of the whole, in which these parts manifest. Through meditation, man puts himself in the position of the whole, of which he is a symbol: his meditation activity simulates the activity of the whole" (p. 10).

According to our subject: (1) all cultures have a centralized symbolic way of regularizing their value system of life, in which it manifests the process of formulating the concept of centrality, such as *'hierarchy of domains'* , *'contrast of domains'* and the like; from the other hand, (2) those values of centralized ideas are also interpreted by using the abstract idea of the concept of centrality which simulates the process of interpreting the concept of centrality, such as *'formal'*, *'functional'*, *'structural'* and the like.

Now, the important questions to emphasize are:

- **whether researchers are in the process of 'formulating' the concept of centrality or in the process of 'interpreting' it**; and
- **if they are in the process of formulating, whether it is 'descriptive', 'explanatory' or 'simulative'**; and
- **if they are in the process of interpreting, whether it is 'formal', 'functional', 'hierarchical' or 'structural'**; and most importantly
- **if they are in the process of structural interpreting of the concept of centrality, whether it is interpreting 'living systems' or 'non-living systems'**.

The task for this study is to formulate the concept of centrality by comparing descriptive, explanatory and simulative approaches, mostly in terms of the structural

interpretation of the concept of centrality in the process of living complex social systems.

Because 'centrality' is a broader concept than even that embraced by 'city', the agenda of this study would be vast indeed unless the discussion were tied to something concrete on the surface of the earth. And so in the foreground is kept the aim of throwing some light on city centre origins and development. In a sense, there were two avenues leading the study to consider on the one hand the problem of central places and on the other hand central areas of cities. The one problem that both subjects have in common is that of centrality, and it gradually became clear that 'centrality' is an idea, and that the appearance of a centre on the surface of the earth is basically the manifestation of an abstract idea.

Also, centrality is not only a value by itself but also contains the other values as well. Rules and patterns such as centrality create order in human life, but norms and values give meaning to them. Without values man couldn't be able to analyze his daily life and centrality is a pattern from which the hierarchy of 'values' and 'facts', or of 'subjects' and 'objects' emerge.

In other words, centrality is an important device in designing cities. It is in fact the aim of this study to search for the ideas of this pattern which are more progressive than being limited to some geographic and geometric points of views. In designing cities, visual senses are very important but feelings and attitudes are more important. Sometimes centre has no special visible effects, or even has no visible structure, but it exists in the mind. Even, if it is not a point or a statue or a waterfall, but it exists in the abstract. What is it? What should be centre in our cities? How has centrality been presented in the past? Is it therefore possible to determine the city centre by a just commercial centre?

Technology has changed all traditional frameworks and their expressions are confused now. It is now necessary to know new purports based on new needs. Do we have to follow the past or we should make new vocabulary based on the basic rules which have been examined in the past? Is it possible to reject the concept or could we have any doubt about it? Nowadays urban design and architecture prefer to use the visible aspects of centrality, but there are also

some invisible and deeper aspects of this principle in our traditional cities. Since urban systems are all examples of living systems, urban centres are also examples of living entities. They are centres of producing the organization and change in our cities.

1.3. The Seeds of Fulfilment: The Future Concept

For further elaboration on the concern of this study, the following **'deductive'** conjectures on centrality in cities, among many others, quoted from Bird[5] (1977, pp. 1-2), are placed below. A comparison has been carried out by the author between Bahraini's (1992) 'inductive' conjectures on *centrality as a general concept* and that of Bird's 'deductive' conjectures on *centrality as a particular concept in cities*. They correspond each other in many aspects. Phrases in the brackets have been compared by the author.

1) "The idea of a centre involves the idea of a non-centre, or tributary area with distance decay to a periphery - a 'worldwide habit' (Tuan, 1973, p. 416)." [This refers to *the hierarchy of properties* in individual entities that in them domains are reduced by hierarchy of properties. Centrality divides them into *familiar* (centre) and *strange* (non-centre) parts.]

2) "The idea of a centre involves a comparison between places and this produces spatial variety and spatial ordering." [This refers to *the start point* and *the end point of properties* in different entities that any property finishes somewhere, a parting line which there is a property on one side and another property on the other side. Centrality represents the *contrast of properties.*]

3) "Cognitive processes are comparison processes." [This refers to *the contrast of properties* in various entities that the difference between two properties is the

[5] Professor Bird in his book 'Centrality and Cities' presents a synthesis of the many approaches to the study of a central feature of modern life - the city, including its distant past and its future. He sees centrality as a mental projection on to space, and discusses the concept in relation to three types of its manifestation in spatial terms: the city as centre of a tributary region; the centres and central areas of cities themselves; and the city considered as a centre or gateway for other distant regions, often overseas.

possibility of their identification. It is possibility of *variety*, *multiplicity*, *comparison*, *selection*, and *searching* in different properties.]

4) "Comparison functions are basic in human psychology." [This refers again to *the hierarchy of properties* or *the contrast of properties*. This contrast creates the direction of properties e.g. far and near or from centre and to centre by which we can build a memory imagination of any property. Centrality creates *security* because it builds familiar properties.]

5) "There is a psychological human need to erect centres." [This refers to *the balance point* or *the static state point of properties* that causes special *regularity* by which the resultant of forces become zero.]

6) "Centres in the real world reflect a need for centres in the inner world." [This refers to *the order and regularity of properties. This regularity* separates any unknown complexity into a significant one by which it becomes more *understandable*, *measurable*, *comparable*, and *predictable*.]

7) "Regional economics requires centralized outputs to interregional and international trade when regions are regarded as open systems." [This refers to *the influence domain of properties* that in open systems properties interfere into each other and work together collectively. But, **by this comparison the author would like to add that in the process of interfere of different properties concerning open systems, the regular repetition of these properties alters with the laps of time**. **So, the main point to emphasize is the origin of this regularity not the regularity itself - the process**. Or, in other words, the important theme is the centralized outputs of these open systems and not the regularized interaction of their parts. Therefore, in terms of the research question, it reflects *'how does this centralized regularity arise?'* not *'how does it work?'* or *'what function does this centralized regularity have?'* and not *'what has produced it?'*.]

Consequently, whereas in this study (1) **we are in the process of 'formulating the concept of centrality in urban centres', it needs to be 'explanatory' i.e. 'understanding how central regularity arises in urban centres'; and whereas** (2) **we are in the process of 'formulating the explanatory concept of centrality in urban centres', it also needs to be 'simulative' to characterize the 'function-modelling of arising the central regularity in urban centres'** (see 1.3.1.1. on the difference between descriptive images and the explanatory concept).

8) "Urban centres are systems of organized complexity and can be analysed by general systems theory, or converted into synthetic models by statistical dynamics if treated as systems of disorganized complexity" (p. 2). [This refers to either *the kind of phenomenon we are looking for* or *the kind of pattern we intend to conform to.* **Therefore, the author would like to raise a main question that what kind of complexity an urban centre is, and what kind of pattern could we possibly choose for analysing it. In non-living complexes the system itself remains the same as time passes, but, in living complexes the system alters with the lapes of time. So, the pattern we should look for it must also alter from time to time. Is it the static regularity of a non-living system which we choose as a pattern for our analysis, or it is the origin of dynamic regularity of a living system that we need to look for it**?]

Resulting, whereas we are also in the process of 'interpreting the concept of centrality in urban centres' it needs to be 'structural' i.e. 'interpreting the concept of centrality in living complex urban systems'.

1.3.1. The Method of Fulfilment

By now to answer to those questions raised above it is necessary to mention about the method of fulfilment. Hartshorne (1960, p. 172) once defined Geography as 'the study' that seeks to provide scientific description of the earth as the world of man'. Parallel with this, and relevant to the present topic, an editor of a book on the internal structure of the city perceived a theme that permeated definitions of the city - it was the city as the 'home of man' (Bourne, 1971, p.

13). The home and the world of man include not only the visible environment and man himself but also the mental climate and stored learning with which we come into contact during every day of our lives. Medawar (1961) has dealt with this point at length. He distinguishes between *endosomatic* and *exosomatic* heredities: "... *endosomatic* or internal heredity for the ordinary or genetical heredity we have in common with other animals; and *exosomatic* or external heredity for the non-genetic heredity that is peculiarly our own - the heredity that is mediated through tradition, by which I mean the transfer of information through non-genetic channels from one generation to the next" (p. 96).

It is also noted by Bird (1977, p. 6) that: "Man's actions are not determined by the environment, physical and social, but by what he thinks the environment determines him to do, given the knowledge that he has at any one particular time." This is comparable with Popper's (1972b, 74) thesis of the three Worlds: World 1 (physical world, objective); World 2 (subjective world of conscious experiences); and World 3 (objective knowledge, as in the *logical* contents of books and libraries and computer *memories*). [Note: books, libraries, computers are world 1 objects.] The links between these worlds are summed up in by Popper: "What may be called the second world - the world of the mind - becomes on the human level, more and more the link between the first and the third world: all our actions are influenced by our second-world grasp of the third world" (Ibid., pp. 148-9).

Perhaps this could be understood as a nice demonstration of the Popperian view of the 'scientific method', to which Medawar maintains, in which progress towards knowledge is made by error elimination or reduction, as in the following sequence: (1) initial problem, (2) proposed theory, (3) deduction of testable propositions, (4) testing, i.e. attempted refutation, (5) preference established among competing theories, and further problems emerging (Popper, 1961, pp. 131-4; 1968, pp. 32-3; 1972a, pp. 406-7; see also Magee, 1973, p. 56; and Bird, 1975; 1977, p. 7).

The hypothetico-deductive system (see Appendix 1), outlined in the five-stage process above, is in fact a dialogue between the actual and the possible, and Medawar (1969) has given the argument a very clear exposition:

> "Like other exploratory processes, ... [scientific method] can be resolved into a dialogue between fact and fancy, the actual and the possible; between what could be true and what is in fact the case. The purpose of scientific enquiry is not to compile an inventory of factual information, nor to build up a totalitarian world picture of natural Laws in which every event that is not compulsory is forbidden. We should think of it rather as a logically articulated structure of justifiable beliefs about nature. It begins as a story about a Possible World - a story which we invent and criticize as we go along, so that it ends by being, as near as we can make it, a story about real life" (p. 59).

Therefore, when Bird (1977) combines the first seven of the 'deductive conjectures' presented at the previous heading and says: "*the development of spatial centralities derives from, among other things, a psychological need for varied external phenomena on which to exercise the comparative processes of a conscious brain, and the resultant spatial variety and ordering satisfies fundamental, if often unconscious, human needs based on the stage of technology reached in regions regarded as open systems*" (p. 17), the question arises whether this is a normative process model similar to the five-stage process of the Popperian view of the scientific method or a predictive model. As Bird expresses:

> "It is obviously very vague on processes. Though cities have been the most obvious expression of spatial centrality, the statement implies not only that centres precede cities, but also that they will outlast the idea of a uni-centred city as the scale of spatial thinking changes with changing technology. The model is therefore predictive, and its predictions can be tested" (pp. 17-8).

Actually, by basing the statement on a deductive conjecture about brain processes, as yet unproven, and by applying it to the 'real world' of cities, Bird hopes on two counts to avoid Popper's (1972b, p. 199) class of irrefutable (and therefore non-scientific) theories. He explains: "this is because the statement will be tested by future work in the field of perception strategies and also because it fits into a suggested model solution to some of the problems

involved in city study."

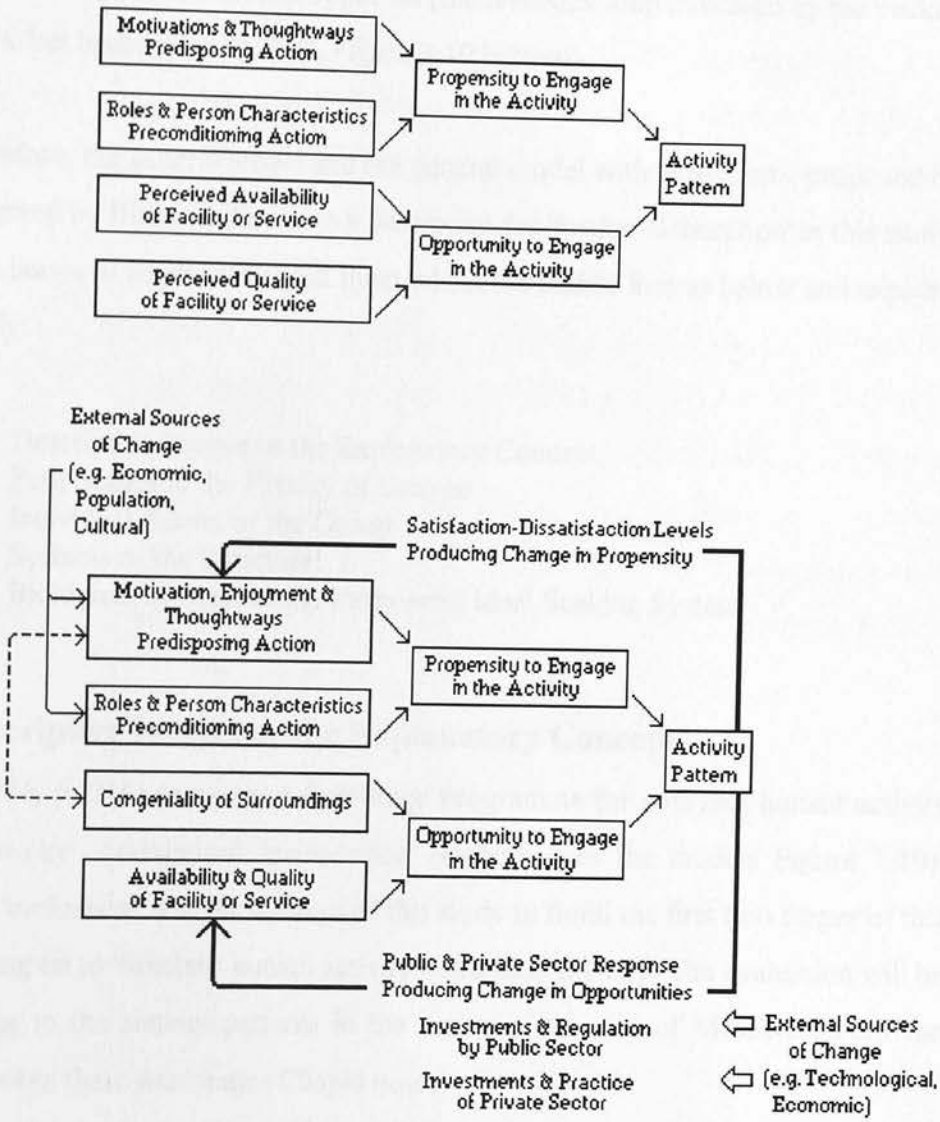

Figure (1.19) Chapin's general model for explaining human activity patterns. Above: The general model. Below: The general model with extensions. The feedback loop indicated by the pecked line with arrow has been added by Bird. (Source: Bird, 1977, p. 21)

In fact Bird refers to the general model and the general model with extensions proposed by Chapin (1974, pp. 32-3) and illustrated here as Figure (1.19). Chapin agrees with the sequence: motivation → choice → action → pattern. Diagonalism helps to explain the box in the top-left corner of the general model. In the extended model Chapin has inserted two feedback loops. The satisfaction-dissatisfaction levels involved in the top loop are very much conditioned by the opportunities for diagonalism in the activity pattern. Bird has also inserted a third feedback loop because in a similar fashion to the determination of levels of satisfaction-

dissatisfaction, the measurement of 'congeniality' of surroundings is conditioned by the levels of opportunity for diagonalism in their appraisal (the feedback loop indicated by the pecked line with arrow has been added by Bird, Figure 1.19 bottom).

By now, therefore, the general model and the general model with extension - proposed by Chapin and agreed by Bird - is chosen as a base point for 'further elaboration' in this study. There are five issues to emphasize about them which the author lists as below and explains them separately:

1) Descriptive Images or the Explanatory Concept
2) Four Stages in the History of Science
3) Individual Actors or the Group
4) Systems or the Structure
5) Biological Systems or the Purposeful Ideal Seeking System

1.3.1.1. Descriptive Images or the Explanatory Concept

As Chapin (1974, p. 216) proposes a four-stage programme for studying human activity patterns in the city: 'description', 'explanation' (embodied in the models Figure 1.19), 'simulation' and 'evaluation', it is the attempt of this study to fulfill the first two stages of this programme going on to 'simulate' human activity patterns in the city. The evaluation will be made according to the activity patterns in the centre of the city of Meshed. About the differences between these four stages Chapin notes:

1. **Description**, which is a phase for studying of patterned ways different subsocietal segments of the metropolitan community use in the city, its facilities and its services;
2. **Explanation**, which is a study of the factors that appear to regulate activity patterns thus described;
3. **Simulation**, that is the development of a model capable of reproducing activity patterns; and finally
4. **Evaluation**, which is a phase in which the simulation model is used to investigate the likely impacts on human activity of the implementation of various alternative plans and policies.

In relation to description and explanation Ackoff and Emery (1972) give a clearer distinction. In their definition of images it is indicated that different observers may describe the same thing differently. This is by saying that their images - mental pictures - differ, and it is their images, not the stimulating object, that they describe. A verbal description of a horse may provide an image of a horse or reveal one, but it is not itself an image of a horse. It is not an image of the horse as a picture is, because the signs used in the verbal description do not themselves have any of the relevant properties of a horse. The picture does. The picture is a sign of a horse that has some of the same (geometric) properties as the thing it signifies. It looks like a horse. As they point: "*Iconic sign* is a sign that has some of the same structural properties as the thing(s) it signifies. Structural properties include geometric, kinematic, physical, and morphological properties. Hence iconic signs look, taste, feel, sound, or smell like what they signify; but they need not, and usually do not, function in the same way as the thing they signify. Iconic signs *individuate*; that is, they represent things or events taken as individuals, differentiated from other things" (p. 166).

It is for this reason that we can have an image of *a* horse but not an image of animal. There is no set of structural properties to individuate animals; functional properties are necessary. Or we can have an image of a pistol but not a weapon, because the individuating property of weapon is functional, not structural.

As Ackoff et al. continue, a physical image is an iconic sign. Images that are not physically represented are called mental. The combination of properties that form an individual's images (is in his/her mind) is the same combination that coproduces his/her responses to noniconic signs. By observation and analysis of his/her response we can determine what his/her mental image is. Therefore, "a mental image is the collection of structural properties and the relationships between them to which an individual responds" (Ackoff, and Emery, 1972). Such images intervene between the sign and what is signified, even when it exists. When it is an image of the real thing, that thing is at least a coproducer of the image. When it does not exist, the image is produced by signs.

The difference in common usage between images and concepts suggests how to define

concepts. As Ackoff et al. explain: "First we note that concepts are not iconic; they do not look like, sound like, and so on, what they signify. Second, **whereas images help us *describe*, concepts help us *explain*. Images connote structural properties, but concepts connote functional properties**" (p. 167).

For Ackoff et al. explanation are of two sorts: (a) "We explain how something comes to be; that is, we identify what produced it." We may explain the presence of the centre in our city by saying, 'it was a religious place', or 'it was the first place for the growth of the city'. (b) "We explain a thing by identifying what it can do - what its function is." We may explain the presence of the city centre by saying 'it is used to circulate vehicle movement without wasting time and energy or without disturbing the order of system'. Hence to say that we cannot conceive of a particular thing is to say that we can't explain it. Either we do not know what could have produced it or we can't determine what it can do, or both.

The definition of an image developed earlier signifies Ackoff and Emery's conception of a concept: "an individuated set of functional properties and the relationships between them to which a subject responds" (p. 167). So to have an image of centre and to have a concept of centre are not the same thing. We can have an image of something without a conception of it. A child may have an image of God but no conception of Him. Conversely, we may have a concept of something for which we have no image. An adult may have a concept of God but no image of Him. Models of reality are either images, conceptions, or some combination of these. A model is a representation of those structural and/or functional properties of reality that the subject believes to exist and to be relevant to his purposes.

Therefore, the sort of 'explanation' which Chapin (1974) **and then Bird** (1977) **have proposed in their general model** (illustrated in Figure 1.19), **only refers to type (a) of definitions about 'explanation'. The models only explain how human activity patterns come to be in the city. They either discover the regularities and universal laws governing human activity patterns** or **correlations of their order, but they do not really identify what they can do** or **what actually produces this correlation. This study, therefore, tends to explain a model either to know *more* about what could have**

produced these activity patterns or to determine what their functions really are.

It is implied by Sayer (1985) that if "we are to explain processes we must discover the regularities or universal laws governing their behaviour.... Hence the thrust of research must be towards the discovery of order" (p. 161). But, Holt-Jensen (1988, p. 122) mentions that this strategy might work within the natural sciences, particularly in physics, but in human affair regularities tend to be approximate, temporally and spatially specific and unique rather than repetitive. As he states: "it is possible to maintain that most models and theories, put forward by the spatial science school, are descriptive rather than explanatory." ***Descriptive models*** **are valuable in so far as they provide new knowledge as to how things are. A presentation of cases which either follows the model or deviates from it does not explain the factors that produce the present situation. Even if we succeed to establish some correlations between data sets, we have not shown what actually produces this correlation. "Note that this does not mean that regularities can never be causal but rather that whether they are can only be determined by a different kind of analysis"** (Sayer, 1985, p. 162). To quote Holt-Jensen (1988), therefore, "**Causes are not associated with correlations and regularities, these are *surface appearances*. We need to look for the *mechanisms* within *deep structures***" (p. 122). And, this refers to the 'function-modelling' or the 'simulative' approach of the principle of centrality which is carried out to establish the differences between different mechanisms of various levels of concern from *surface appearance of structure* to *deep symbolic structure* in the structure of built environment.

Bernal (1969) distinguishes two groups of social sciences. Descriptive social sciences are associated with idiographic traditions and include anthropology, archaeology, geography, history and some branches of sociology. They describe the structures, operation and development of former and existing societies. Analytical social sciences are oriented towards nomothetic approaches and include economics, political science and psychology. Within these analytical social sciences the accumulation of knowledge through description is not as important as the search for structural explanations for different aspects of social life. Holt-Jensen (1988, p. 122) mentions that most scientists would have reservations about this strict bisection of the social sciences. But in every science there is an interplay between description

and explanation, between the study of unique occurrences and general theory.

The author believes that this is particularly true in the case of spatial science. During the qualitative 'revolution' most spatial research workers however, feel an urgent need to develop theoretical explanations. Therefore, the author works to find out what unites different schools of thought, to look at the work as a discipline of synthesis. The study does so by analysing the different routes to explanation and description that have a tradition within the discipline. But, this time by directing the analysis to the simulative approach, i.e. the function-modelling of the concept of centrality in the process of change over time, it makes an evaluate approach to the unique occurrences of the change in the centre of the city of Meshed.

1.3.1.2. Four Stages in the History of Science

With the hindsight afforded by Simon's formulation quoting from Hillier and Leaman (1972) we may distinguish four stages in the history of science, according to where man himself is located in the scientific scheme of things. As they describe:

> "In the first man was nowhere in the scheme of things, or rather he was at the centre, but uninvolved. Science was concerned with the universe external to man: "Man was god-like, the subject but not the object of knowledge. Scientific laws were 'out there' in nature waiting to be deciphered. This may be called the stage of the *science of external nature* which reaches its apex in Newton" (pp. 40-41).

The second stage as note Hillier et al. may be broadly identified with the expansive phase of classical rationalism and empiricism in the seventeenth and eighteenth centuries: "Against a background of progressive secularisation, the paradigms of the science of nature were applied to man himself. Not surprisingly science recast man in the image of the universe described by the natural sciences of the previous phase, that is as a complex automaton, the sum of inputs into him, an intricate assemblage of parts." Empiricism linked the new cosmography to man. But although man thereby became an object of interest to science, he was still epistemologically and scientifically separate from the world he studied. He resembled nature, but was still apart from it: "the covert anthropocentrism of previous times disappeared only

to be replaced by a secularised version of the same thing. Man was still the centre of the universe. This may be called the *sciences of man*" (Ibid., p. 40). Both previous stages separate man and nature, regarding them as epistemologically distinct. But, the third stage is defined by the discovery of remarkable continuities between man and nature. As Hillier et al. continiue:

> "On the one hand: Kant, puzzled by Newton's apparent achievement of 'certain knowledge', which seemed theoretically impossible within the empiricist account to cognition, suggested that 'knowledge' was possible because man, by his nature, imposed certain basic categories on the universe - such as space, time and causality - and that these need not therefore be thought of as intrinsic properties of nature herself. And on the other hand: A similar theme emerged in biology at the same time. Evidence for the influence of environment in the creation of different species had accrued, giving the paradigmatic idea of the interdependence of organism and environment" (p. 40).

These two lines of thought combine to give the stage of the *man-environment paradigm*. This framework hardly existed before the turn of the nineteenth century and there is evidence that it is now disappearing (Ibid., p. 41). And, the fourth and present stage, that of the *science of the artificial*, is a manifestation within science of the current paradigmatic change:

> "The realization that the objects in the domain of human affairs which require science for their understanding are already artifacts (societies, language, epistemology, mathematics, even psychology) yields insight into the naturalist fallacies that were implicit in the programme of the 'human science', and shows that the conflicts between objectivist and subjectivist view, between freedom and determination, between science and intuition were no more than the paradoxes produced by the man-environment paradigm. In this perspective, design becomes the nucleus of action and change, in contrast to the native notion of 'prediction' in the human science" (Ibid.).

In a sense, instead of a useless effort to link the study of man through the study of nature, the

sciences of the artificial are concerned with the artificial entities through which this relation is mediated. Since this relation is artificial, the scientific study of artifacts from tools to computers, from language to societies, from mythologies to cities becomes also the proper paradigm for the study of man.

Therefore, in this perspective it is necessary to mention that the dominant concept of general models mentioned by Chapin and Bird (illustrated in Figure 1.19), **in so far as it offers a paradigm for the scientific analysis and explanation of the complexity of human patterns in cities, has much more in common with the third stage, that of the man-environment paradigm. In fact they generally have two loops: top loops indicating man himself; and bottom loops indicating the environment. In this term, models are no more than a generalization of the conceptual apparatus of the 'man-environment' paradigm, and as a result is out of tune with lines of new scientific theorising. In this thesis, therefore, the study is looking for an anlysis which seeks for the artificial entities through which the relation between man and environment is mediated.**

Hence, it is in the same mode of thought that the Bird's *predictive statement* about combination of 'the seven conjectures on centrality' (noted in page 34 of this study) **is now due to be replaced by the capture of *designated model* of reality. Instead of the statement** (Bird, 1977): "***The development of spatial centralities derives from, among other things, a psychological need for varied external phenomena on which to exercise the comparative processes of a conscious brain, and the resultant spatial variety and ordering satisfies fundamental, if often unconscious, human needs based on the stage of technology reached in regions regarded as open systems***" (p. 17), **it may be stated: to find out how spatial centralities *function* in terms of both 'action' and 'change'** (1) **as an integrated entity of man and environment and** (2) **as an integrated entity of knowledge and experience.**

1.3.1.3. Individual Actors or the Group

In similar fashion to the argument so far, Chapin (1974) believed that it is necessary to move from *the individual actor* upwards to *the group*. He has explained:

> "... to understand behaviour patterns of such segments of a metropolitan community, it is necessary to conceive of these patterns in terms of the behaviour of individuals. Since individuals relate their activities to those of groups and institutional entities, however, in the process of aggregating individual activities into activity patterns for entire population segments, indirectly the study is taking into account behaviours of entities at all... scales of human behaviour. Thus when the term 'human activity patterns' is used, this refers to patterned ways aggregates of residents in the metropolitan community go about their daily affairs, that is, how archetypical persons (statistical means) from key socioeconomic segments of this small society pursue their rounds of daily activity" (p. 11, and p. 21).

Another link between individual and group behaviour appeared in one of the conclusions of Lee's (1968) investigation of the images of neighbourhoods in Cambridge. This extract also indicated a double diagonalism at work: (1) information about the environment is allowed to modify a locational code; (2) the locational code, or socio-spatial schema, is then compared with the actual locality to 'govern' movement within it:

> "People move about the local urban environment to satisfy a wide range of needs with minimum effort. The continual locational coding that arises from this activity precipitates in the form of a socio-spatial schema which, in turn, governs future navigation and movement. Each schema is unique, but is related in lawful ways to the physical environment and to the personality of its possessor.... Consentaneity of schemata occurs in varying degrees and its measurement provides a means of predicting behaviour for a given aggregate of people with a territorial base" (p. 263).

Such easy two-way movement between the individual scale and the group scale, and the ability to integrate one in terms of the other is in contrast to the approach always from the individual to the group, where there could arise difficulties of a different 'image geography' for every individual (Watson, 1975, p. 272); and there have always been powerful warnings against such a building-block methodology.

Mills (1959) dubbed as 'psychologism' those attempts to explain social phenomena in terms of theories about the make-up of individuals. This sociological approach found support, noted Bird (1977), at a mechanical level in which the difficulties of working at the micro - or individual scale are stressed; e.g. ten people shopping at four stores can generate one trillion possible configurations. This does seem rather daunting. In a sense, it appeared respectable for geographers and sociologists to reduce down as far as somewhere in 3 in Figure (1.20), provided that they remain at the group or institutional level.

5 spatial pattern, function; social pattern, structure
4 behaviour
3a values and/or attitudes
3b motivation to comply with norms
3c normative beliefs
2 psychological drives
1 brain processes

Figure (1.20) Five Stages of Psychological Reduction (Sourse: Bird, 1977)

It is in the same way that MacTaggart (1965) marshalled references to those who have taken an opposite view: "... there are those who contend that social phenomena must be explained in terms of the perspectives and fields of action of individual persons; overall trends are therefore to be interpreted as the sum total of individuals' actions which are comprehensible as such" (p. 222).

In the 'theoretical study of the perception of environment', Sadler (1970-1, p.35) also observed that 'the concepts involved *in the processes of individual perception and response* can be extended to groups of individuals.' Svart (1974, p. 302) and Hudson (1976, p. 171) also discussed the problem, moving upwards in Figure (1.20), the 'links between individual choice and group behaviour patterns.'

But, from the other hand, Renfrew (1972, p.37) faces the difficulty of psychologism when putting forward his multiplier effect theory for the emergence of civilization: "Changes or innovations occurring in one field of human activity (in one system of a culture) sometimes act so as to favour changes in other fields (in other subsystems). The multiplier effect is said to operate when these induced changes in one or more subsystems themselves act so as to

enhance the original changes in the first subsystem."

Renfrew, hence, admits that his theory depends very much on individual behaviour, and after discussing the problem (p. 495), he concludes that the individual component in a theory is not a weakness. While grouping of units enables them to be described statistically as far as their behaviour is concerned, this cannot be so easily explained if reference to individual units is omitted (p. 496).

Therefore, it is now necessary to mention that a model which begins with a selected observables and interactions cannot in principle be developed as a theory of the complex system it represents. A definition (i.e. sets of elements and relations) - as illustrated models in Figure 1.19 - **and a strategy (i.e. statistical aggregation in the model)** - as developed above - **of the 'system approachs' appear natural, but lead to severe scientific problems**. Hillier et al. (1972) explain the alternative to this whole approach by the example of the *two lines of research in the study of intelligence*:

(1) "The [first] strategy is one of deciding what behaviours indicate what kinds of intelligence, then examining populations of various kinds to see how these behaviours are distributed, and therefore how well the assumptions about the theoretical nature of intelligence can predict performance in other areas like, for example, schoolwork" (p. 50).

It is concluded by them that the basic strategy of aggregating behaviour statistically in terms of a conceptual model which relates the aspects of intelligence together, and which can be expected to be progressively refined as the research programme develops, bears a remarkably formal resemblance to the 'systems approach'. This is the same as was commonly believed is the proper research strategy for the study of human activity patterns in the city (those mentioned above about the relation between the statistical individual behaviour and group behaviour).

But researchers like Piaget, on the other hand have taken a quite different view of

'intelligence'. Instead of aggregating behaviour, say Hillier et al., within a framework of general assumption about what 'intelligence' is, and what behaviour indicate its presence, the question has been; what kind of structure must exist in the operation of cognition for such behaviour to be possible? Hence:

(2) "The [second] strategy is that at a certain stage of child development certain behaviours (for example, solving particular types of problem) are possible for the child and others are not. Experiments are devised to test whether behaviours are possible and impossible at the various stages, and these constitute test of the theories which take the form of a formal model or structure."

Actually, the whole empirical and experimental strategy is different, but more important is the fact that the whole epistemological strategy is different. As Hillier et al. (1972) stress: "The models that Piaget makes are 'simulations of structures' which must in some sense already exist in the child for those behaviours to be possible.... The meta-theory is that intelligent behaviours are possible precisely because the child has structures and the theories of the scientist will therefore be attempts to replicate these models" (p. 50).

The same point can also be made of Chomsky's generative grammar: "... the structure that Chomsky proposes is not simply a convention defined for the scientist's purposes from outside the system. It is an attempt to make a model of those structures that must already exist within a language in order for it to be possible for that language to be used in a rule-governed creative way" (Ibid.). Hence, one of the effects of the change in scientific analysis and explanation of complex realities (stages of the history of science) is the reformulation of the problem of the individual in society. To quote Hillier et al. (1974):

> "The entrepreneurial concept of the individual as the source of society has no place in new analysis, since all structures - languages or cities, for example - exist independent of any individual and are passed through time as culturally transmitted and transformed genotypes. The individual is not the prime mover, and structures do not arise out of the interaction of individuals or their behaviour" (p. 73).

As they conclude: "The individual is relatively epiphenomenal to the processes by which societies transform their structural inheritance. But having abandoned the individual as the source of existing structures, he may be recovered as a unique and creative being, because he is the product of structures which exist independent of him. Each individual acquires genotypic cultural structure, but because the concept of 'rule governed creativity' aptly describes human behaviour the individual produces endless idiosyncratic transformations" (Ibid.). **Therefore, it is the structure of activity patterns which focuses the task of this study not the process of aggregating individual activities into activity patterns**.

It might be also useful to comment briefly Giddens' (1979) idea about the debate over methodological individualism in social theory. There is, of course, no unitary view that can be identified as 'methodological individualism': the phrase has been used to cover a variety of different ideas. But, briefly considered here is the formulation offered by Popper. Popper (1966) has described his standpoint as follows: "All social phenomena, and especially the functioning of all social institutions, should always be understood as resulting from the decisions, actions, attitudes, etc. of human individuals... we should never be satisfied by an explanation in terms of so-called 'collectives'."

Giddens explains that "the first part of Popper's statement reflects the inadequacies of action theory. **Institutions do indeed 'result' from human agency**: **but they are the outcome of action only in so far as they are also involved recursively as the medium of its production**. **In the sense of 'institution' therefore, the 'collective' is bound to the very phenomenon of action**."

Actually, 'institution' is distinguished from 'social system' or 'collectivity'. Institutions, to quote Radcliff-Brown (1940), may be regarded as 'standardised modes of behaviour' which play a basic part in the time-space constitution of social systems: "the standardisation of behaviour in time-space involves its chronic *reconstitution* in contingent contexts of day-to-day social activity" (p.9).

Also, in the same vein by Giddens it is argued that: "the 'externality' of society vis-a-vis the

individual is shown by the fact that society exists before each of its members is born, and constrains or moulds the process of their development." Giddens further continues we can accept that *processes of socialisation* are basic to an account of the institutional organisation of social systems, so long as three important points are borne in mind:

> "First, socialisation is never anything like a passive imprinting by 'society' upon each 'individual'. From its very earliest experiences, the infant is an active partner in the double contingency of interaction and in a progressive 'involvement with society'.... Second, socialisation does not just stop at some particular point in the life of the individual, when he or she becomes a mature member of society. That socialisation is confined to childhood, or to childhood plus adolescence. But socialisation should really be understood as referring to the whole life-cycle of the individual."

In a sense, such an assertion does not go far enough if it simply refers to the continuity or temporality of the life-course. For this still treats 'society' as a static or finished order, rather than recognising the *mutuality of time-process*, linking the life-course to the inherent temporality of social reproduction. Then, finally: "we cannot appropriately speak of the process of socialisation, except very loosely. Such a phrase implies too much standardisation or uniformity on two sides: as if there were a single and simply mapped type of 'process' which every individual undergoes, and as if there were a consensual unity into which each individual is socialised." And this, therefore, implies it is more crucial to the complexity of the process of socialisation when it is associated with human activity patterns involving built environment. And, this encourages the study to draw out more about the basic differences between the paradigms of 'system' and 'structure' as they exist in the *science of the artificial* today.

1.3.1.4. Systems or the Structure

It has been characterised by Hillier et al. (1974) that system is concerned to construct new models of social phenomena from a standpoint outside the system: "System stresses observable phenomena which may be measured. From an epistemological point of view it stresses that the model is relative to the observer, not absolute; it represents nothing within the system. Its nature depends on the purpose of the model-maker."

For further debate on 'system' and 'structure', still focusing the discussion on cities, the author refers to Jacobs (1961) who in her book 'The Death and Life of American Cities' (p. 429) confronted the methodological problem. She relied on Weaver (1967, 1958) who listed three stages in the development of scientific thought:

1) "Ability to deal with problems of simplicity containing two factors which are directly related to each other;
2) Ability to deal with problems of disorganized complexity by means of statistical mechanics (randomness of patterns suggest randomness of forces);
3) Ability to deal with problems of organized complexity where the variables are interrelated (any randomness of pattern masks complex interaction of forces)."

Bird believes many of the problems concerning cities are treated as though they were of type 2, and though much progress is achieved thereby, cities obviously present problems of organized complexity. Forrester (1969) comes to a similar conclusion. He notes that complex systems present apparent causes that are often coincident systems, such that symptoms are often erroneously labelled causes from analogy with simple systems (pp. 9-10). Faced with this problem, Rogers (1967) advocated a probabilistic approach as one way forward, generalizing the combined effect of a very great number of interdependent factors.

On the one hand, the 'system approach' has been advocated as an analytical tool in solving problems of organized complexity (for example by Renfrew, 1972, pp. 17-26; and Proshansky, Ittelson, and Rivlin, 1970, p. 278). Or, as Hillier et al. have concluded in 1972, "most recently the 'system' concept has been put forward as a framework, both for scientific theory and for environmental design (for example by McLoughlin, 1969; Chedwick, 1971; March, 1971; and Wilson, 1969)." Or, in the same vein by Lyons in 1972: "... the 'system view' may now be said to constitute a school of thought within the environmental disciplines."

But, from the other hand, Michelson (1970, 24) calls for an intersystem congruence model which would study the interdependence of the 'physical environment' and the 'social structure'. He criticized the school of human echology because the assumptions and point of view of its

adherents were not adapted to the treatment of attitudes, sentiments, and motivation, i.e. level 3 and below in Figure (1.20) (Michelson, p. 21, quoting Hawley, 1950, p. 180). Also, Bird criticises that: "general systems theory has undoubted analytical value in studying a system of organized complexity like a city, but it does not of itself provide clues to the leading part in the process of centralization, to use the very terminology of systems theory" (p. 24).

In the same vein Hillier et al. (1972) mention: "yet a main theme in twentieth-century has been the theoretical characterisation of complexity and organization in phenomena. A series of fundamental concepts, including 'gestalt', 'system', 'field', 'cybernetics', 'communication' and 'structure', mark the gradual unfolding of the 'science of organization'. Most of these concepts have been canvassed from time to time in the environmental field as proper theoretical vehicles for research" (p. 36).

In fact, in this gradual unfolding of the science of organization, the system approach only deals with the type (a) of explanation of a complex sysytem, to determine how a complex system comes to be or **what produces it. It introduces that "a 'system' is some complex made up of entities of lesser order, forming a pattern of relationships that are in some sense regular** (Ibid.)." **But, there is also a need for structural approach in the environmental field, to know more about type (b) of explanation, to determine what a system really can do** or **what its function really is when it processes over time**.

Structure has begun to be explored in environmental sciences, and, as elsewhere, its first outcome is reformulation at a theoretical level. "**It begins by substituting for the question 'How far does artifactual environment determine human behaviour?' the question 'What human behaviours determine the artifactual environment?'. The traditional approach to urban modelling which aims to relate patterns of activity to patterns of space, gives way to an account of the generation of space by society and of its subsequent transformation and elaboration**" (Ibid., pp. 70-71). **The primary relation between behaviour and space is held to be one of discovery, elaboration and transformation both in a cognitive and action sense**.

In a sense, social actions always take place within a framework, an empirical connection. The framework for empirical connection is space. Actions are imprinted by socializations that take place in space. Space is created and recreated by people who use their intellectual capacities within the frames set by social rules and mechanisms (Giddens, 1984). **While empirical research may show us how this happens and describe what constitutes the mosaic of a pattern, only theoretical research can answer the more fundamental 'why' questions about the relations between agents and what they regard as constraining mechanisms. This defines the principle issue with which the study should be concerned: that of connecting the notion of human action (and not human activity patterns) with structural explanation in socio-spatial analysis. It should emphasize on elements of time and space that every process involves.**

1.3.1.5. Biological Systems or the Purposeful Ideal Seeking System

For to have a debate on last last point, the author starts from ethologists who tried to identify the leading parts of human behaviour by analogy from the animal world. This has led to some excesses in popular literature and severe criticism from psychologists (Proshansky, 1970, p. 178). One must agree that man's social structure, broader experience, and symbolic reasoning, transmitted from one generation to another make such analogies very dangerous (Rose, 1962, p. 6). Tuan (1975, p. 206) distinguishes between 'liberals' who seek to deny differences between animals and people and conservatives who believe that man's symbolic reasoning places him apart.

In a review of the historical evolution of territoriality in man, Soja (1971, p. 28) built upon the idea of change from a social definition of territory to a territorial definition of society (Ibid., p. 13). Territoriality of whatever type, as both Darling (1952) and Ardrey (1966) discovered, inevitably involves a consideration of both centre and periphery, to which Ardrey added a third element - identity. Ardrey's 'castle and border' interpretation of territory combines the security of a centre and the stimulation of danger at the border, with the combination being the foundation of identity: "I find it useful to define the three terms in terms of their opposites: to think of security as the opposite of anxiety, of stimulation as the opposite of boredom, of identity as the opposite of anonymity" (p. 170).

This chimed in with Hebb's (1949) belief that many of our activities give clear evidence of the need to raise the level of excitement (1958, pp. 252-4). Also, to quote Carr (1967) who expressed: "the physical environment needs to offer the maximum freedom of choice (p. 529): sometimes to be where the action is; sometimes to be away from it all." And Wohlwill (1966, 32) who believed that *novelty, complexity, variation, surprisingness*, and *incongruity* are all involved.

Most human beings have a 'home' which they regard as a 'centre' for varying proportions of time. Yet an individual knows that this is not the centre for his/her community. So a continuous double-think is a requirement of living in a community and particularly in a community geared to an urban centre. Moles and Rohmer (1972) considered these two philosophical systems so important that they opened their study of the psychology of space with a discussion of the polarity: me, here, now a personal philosophy of centrality; and a philosophy of objective Cartesian space within which there are impartially observed discontinuities, like centres and peripheries (pp. 7-10). For these two authors this was 'a fundamental irreducible contradiction between two concepts of space' (p. 145; see also Tuan, 1973, p. 416). There are also the concepts of territory and orbit . As Parr (1965) stated: "The first is an area which an individual or a close-knit group claims as its own; whereas an orbit is an area through which there is habitual or occasional movement and may contain two or more territories (home and office for example)."

The debate about psychologism could continue for some time, and more workers from contrasting disciplines could be marshalled to speak for both sides. In a sense, search for a psychological explanation can easily lead into the problem of an infinite regress. To quote Bird (1977), Popper (1972b, p. 47) faced this difficulty in his system for scientific discovery, where a hypothesis, or frame of reference, or 'expectation' must precede observation. Popper is even driven to the idea of inborn expectations. One of the most important of these is the expectation of finding a regularity. Here we have arrived close to inborn relation between an internal orientation and an external situation. This is how the idea of a centre could be projected onto an apparently featureless plain, and we have our question about the emergence of centres in a possible world.

The proving of a physiological basis for the way we think creatively, recreatively, and aesthetically about space may be difficult. Fortunately, Gregory (1973, pp. 55-6) in distinguishing between the brain's physiological and strategic functions has shown that cognitive strategies can be investigated without the associated physiological processes being completely understood. Hence, "what is lost to view is mind as correlate of the world of objects, as that for which is a word constituted" (Skjervheim, 1974, p. 216). Holt-Jensen (1988) notes that the *Diltheyan tradition*[6] supports the use of empirical methods within the natural sciences but does not agree with Comte[7] (1798-1857) that the social/cultural sciences should copy the methods of natural science. When social scientists borrow models of system building from natural sciences they must treat all their elements as objects. When the mind is treated in this way it is materialized either directly by being conceived of as the thing that thinks, or indirectly by being considered as a relation between objects in the world. The same applies to behaviour.

At the extreme, we might talk about brain processes instead of ideas or images, but we cannot study human behaviour in the same way as we study animal behaviour. The difference is that men have *intentions*. Intentional expressions such as 'to imagine something', 'to believe something', 'to love somebody' cannot be translated into the 'thing' language of the natural sciences: they cannot be understood as objects as seen from the outside. This is the principle of *subjectivity* in social science, which says that behaviour has to be studied and described in terms of the actor's orientation towards the situation. This is concerned to the differences between biological systems and purposeful ideal-seeking systems, and this is the comparison between these two, which orients the method of this study in conceptualizing the concept of centrality in the structure of built environment.

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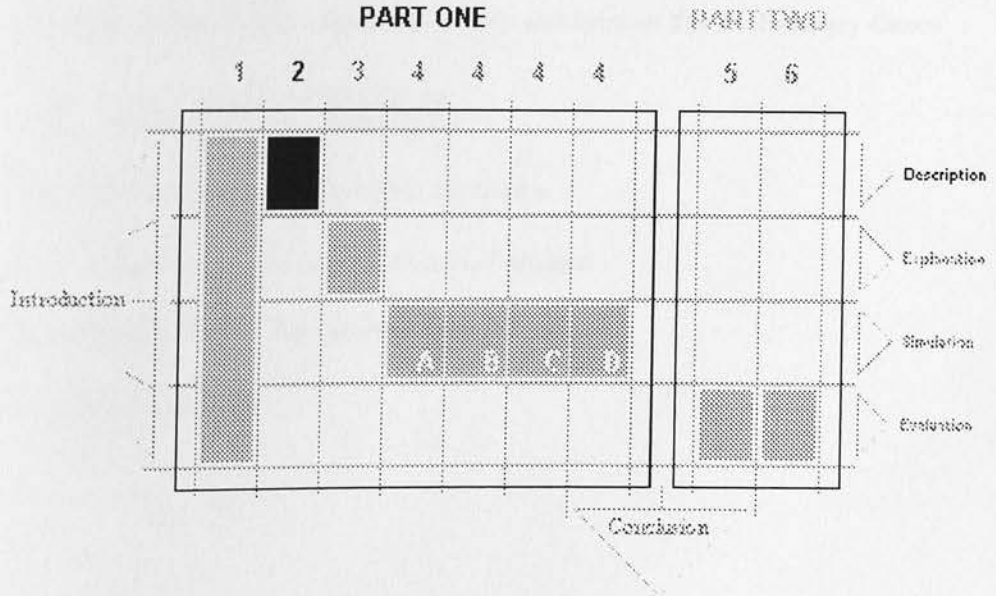
[6] Wilhelm Dilthey (1833-1911) considered that while we *explain* nature, we *understand* social life and human intentions. The distinctive properties of social science which have developed out of the Diltheyan tradition necessitate a twofold division of the sciences into *natural* sciences and *cultural* sciences.

[7] The concept of positivism was established by Aguste Comte (1798-1857) during the 1830s in French. The positivists showed that philosophy was an 'immature' science. Philosophers, like other scientists, should not concern themselves with speculative matter, but should study things they could get to grips with: material objects and given circumstances.

2

CHAPTER TWO

CENTRALITY *and* THE STRUCTURE OF COMPLEX URBAN FORMS



2

CENTRALITY *and* THE STRUCTURE OF COMPLEX URBAN FORMS

DESCRIPTIVE IMAGE:
Individuating the Structure of a Complex Urban System

What the Shape of the Structure of a Complex Urban System is?
Geometric, Physical, Morphological, ...?

Introduction to Chapter 2

As mentioned in previous chapter, in understanding complexity, the process of formulating theoretical concepts is the only device that man has at his disposal to help him deal with the highly complex world. And, this is the important role of these concepts that the study is looking for the concept of centrality following some concern to the nature of complexity.

According to the principle of centrality applied in urban environment many suggestions has been made of different ways of trying to formulate this theoretical concept in built environment. As remarked before, this study is an attempt to bring together some of these proposed ideas about the principle of centrality in the structure of built environment. One of them has been originally put forward accompanied by a decoration of 'complexity of urban forms' only by *describing* what constitutes the mosaics of urban patterns.

Since the task of this study is to formulate the concept of centrality by comparing 'descriptive', 'explanatory' and 'simulative' approaches, this chapter mostly tends to *describe* or *individuate* the structure of complexity of urban forms to image what their shapes really are. It is, in fact, in contrast with *explaining* or *understanding* them to determine either what could have produced them or what their functions really are. It only deals with *surface appearance of structure* and not the *mechanism* within which the *deep symbolic structure* of the built form is appeared. It, therefore, does not also look for the *simulate* approach of the differences between different levels of functions within which the appearance of complexity of urban forms is emerged: only a 'descriptive' approach of analysis, placing the concept of centrality in the nature of 'complexity of urban forms'. In fact, the approach looks for the context of general ideas of 'visual perception' and of 'symbolism'.

The chapter starts with a quick look to the nature of complex forms to find out how we characterise a centre to describe an appearance. Then, it continues to see how we describe an urban appearance to highlight the symbolic genesis of the centre in urban patterns. It goes then to determine how we symbolise the creative power of the centre that an evolutionary centre as a symbol itself contains all other symbols in its symbolic character. At the end, the chapter concludes some of the reasons for symbolic needs in our contemporary cities.

2.1. The 'What' of Central Expression - Description of an Appearance: The Centre

To illustrate the relationship between centrality and the complexity of forms, we need to know more about complex shapes. **Perhaps the simplest examples of complex *things* which one comes across are complex shapes; in them, nothing is changing, and nothing is engaged in active interaction with anything else**. Even so, they are quite difficult to grasp or describe. Propounding some of these descriptions as an introduction to identification of the centre, the author refers to Waddington's writings in 1979. It is to define, somehow, the 'what' of central expression in natural patterns.

2.1.1. Symmetry and Ordered Shapes

One of the first steps we commonly take to try to make sense of a shape is to look for **symmetry** in it. The derivation of the word symmetry - from two Greek words meaning 'with, or accompanying' and 'measure' - gives it the very general meaning of referring to parts with similar geometrical properties; and many of the things we come across do have parts with similar properties (Waddington, 1979). There is no doubt that a shape which we can describe as an orderly symmetrical arrangement of similar parts is much more comprehensible and graspable by the mind than it would be if it did not contain any similar sub-parts, or if those parts were just scattered, without any rational principles of arrangement.

There are relatively few possible types of symmetry, basically three ways in which we can arrange a shape in some sort of symmetrical relation to it:

(a) one is to produce its mirror image (Figure 2.1a);

(b) another is to displace the original shape, through a certain distance; and

(c) there is a third way of producing symmetry, simply by imagining that there is a line perpendicular to the plane of the paper, and that the shape is rotated around this as an axis, but one can combine these rotational symmetries with mirror symmetries, and so obtain arrangements containning both right - and left-hand shapes. These three types

of change determine the only three basic types of symmetry that are - 'reflectional', 'translational' and 'rotational' (Ibid., p. 39).

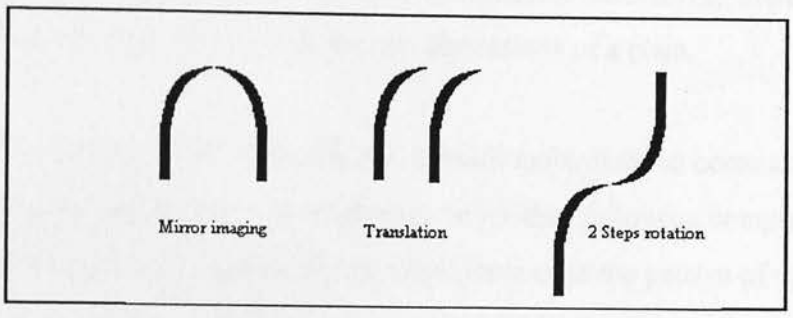


Figure (2.1a) Some Symmetrical Relations of a Shape (Source: Islami, 1998, after Waddington, 1979, p. 39)

There are also only a relatively small number of ways in which these symmetries can be combined with one another. If one is concerned with flat patterns, which can be drawn on a plain sheet of paper, as Waddington (1979) notes, there are only seventeen possible arrangements of combined symmetries (Figure 2.1b). Centre in these arrangements of symmetries has a dominant role of combination.

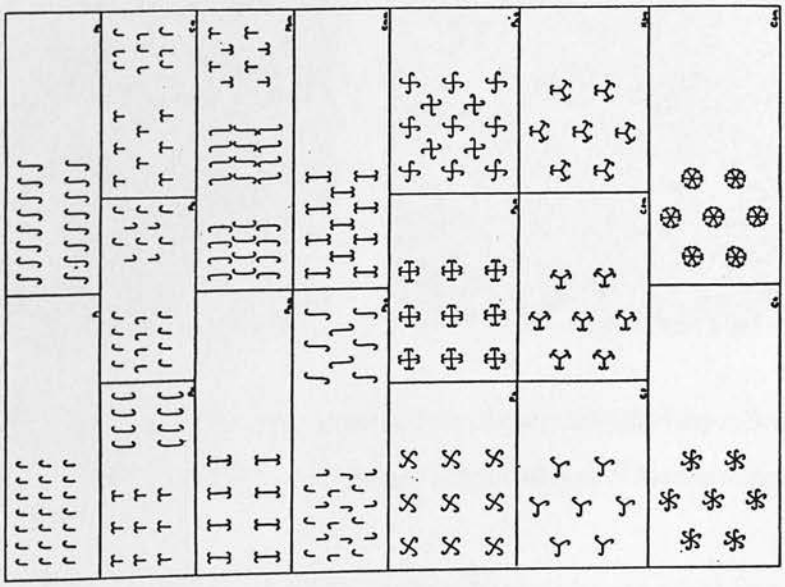
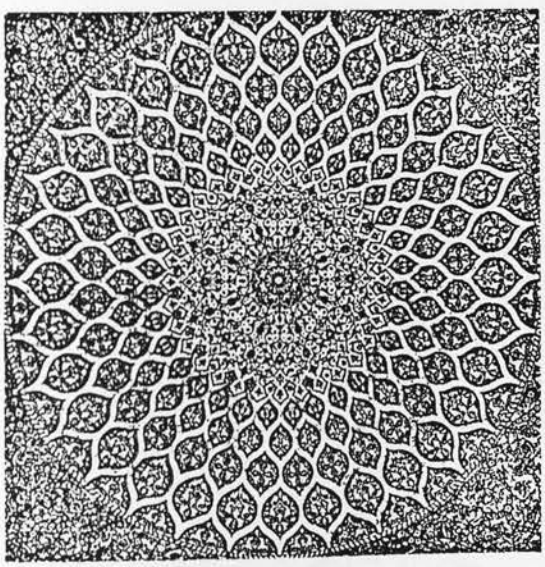
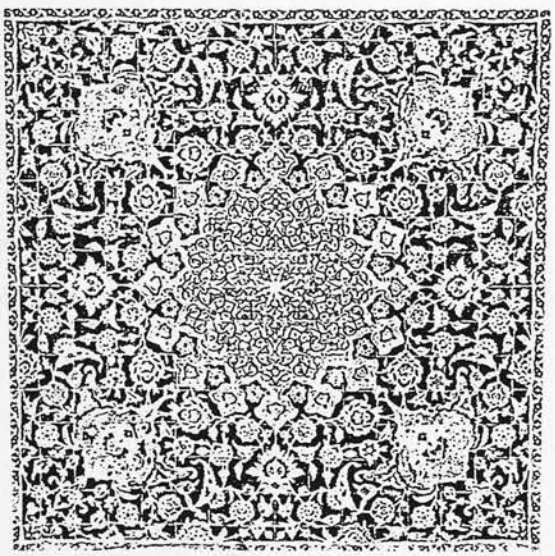


Figure (2.1b) Diagram of 17 Symmetry Groups (Source: Waddington, 1979, p. 40)

The most perfect examples of symmetry in the real world are the arrangements of atoms and molecules in crystals. These cannot be seen by the naked eye or even with an ordinary microscope; but the positions and arrangements of the atoms can be discovered by the use of X-rays. Since they are arranged in solid three dimensional structures, there are more possibilities of symmetry than there are in the two dimensions of a plain.

In most of the more ordinary affairs of the life one is much more likely to come across things which show only some partial degree of symmetry, rather than following completely any of the precisely specified patterns. In many cultures artists have used the pattern of symmetry as a method for introducing a certain definite but not overwhelming sense of order into their productions. In fact, in different arts symmetry is used to define centre. And, in various hand crafts symmetry is based on the whole attention to the centre, the point which explains the space and all components follow it (Figures 2.2a and 2.2b).





Figures (2.2) Left (a): Iranian Carpet Representing the Dome of the Sheykh Lotfollah Mosque (Source: Bakhtiar, 1993)
Right (b): Faience Mosaics of the Pillars of the Main Sanctuary of Jame Mosque of Kerman (Source: Izadpanah, 1993)

However, symmetry, in the strict sense in which we have been using the word, is certainly not the only property which can impart a degree of visual unity to a shape. There are other

arrangements, in which the parts are related in some specific mathematical ways, which the mind can accept as orderly, even when it cannot immediately express the precise arrangement underlining the order.

2.1.2. Shapes, neither Symmetrical nor Ordered

Many, probably most, natural complex shapes exhibit little symmetry. The conventional procedure is to think of them about their outlines (let us confine ourselves to two-dimensional flat shapes, for the sake of simplicity). But this is not very satisfactory. The outline is probably very difficult to describe; moreover, if we are dealing with a living thing such as a fish or worm, the outline will change drastically as the animal wriggles, yet clearly in the same sense the shape remains the same or almost the same. Finally, if we think only of the outline, can we even say just where the shape is located?

Another way of treating complex shapes, developed by Harry Blum, considers the shape as made up of several overlapping circles, the largest that can be fitted into the shape (Waddington, 1977, p. 43). The centres of these circles will lie on a line or a set of lines. Such a line is known as the 'medial axis' or 'symmetry axis', since it expresses a property of the shape related to a very generalized concept of symmetry (Figure 2.3). As Waddington expresses: "Now we can say that the location of the shape is given by the position of the centre of the largest inscribed circle. And we can alter the shape slightly, while retaining its basic form, by flexing the symmetry axis while retaining the same set of circular disks" (p. 44).

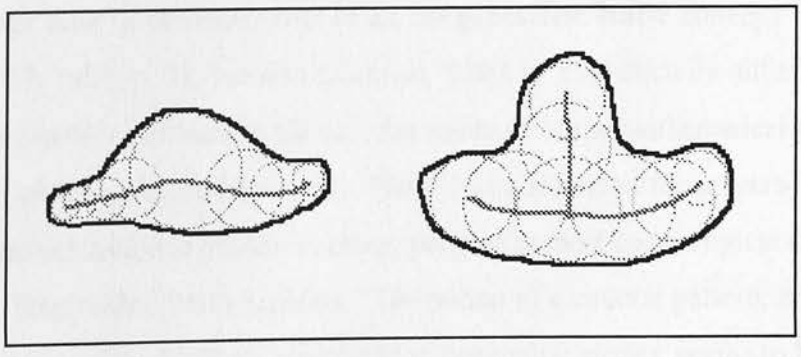


Figure (2.3) A Shape Made up of a Number of Overlapping Circles (Source: Islami, 1998, after Waddington, 1979)

Here also the location of the shape is given by the position of the centre of the largest inscribed circle. And, to describe a shape in these terms, we have to know not only the symmetry axis, but also the size of the circles which are to be centred on it. Clearly, there are many changing and growing shapes which can be described in this manner. In a sense, by applying the Blum technique of 'medial axis transformation', we can transform the complex outline into somewhat simpler shapes of internal medial lines. But, it is undoubtedly a weakness that the analysis has to be made on a series of two-dimensional outlines, whereas really, we are trying to compare three-dimensional solid structures.

2.2. The 'Why' of Central Expression - Urban Appearance: The Symbolic Genesis of the Centre

In order to individuate and compare the three-dimensional solid urban structures, the study therefore need to find out how we describe an urban appearance. **That is to determine the 'why' of the central expression in urban forms which is derived from the observation of nature itself. It is in fact questioned to highlight the symbolic genesis of the centre. The evidence so far examined the way we describe the nature of different appearances of natural patterns to characterise the role of 'centre' and 'circle' in nature. Now, it is time to examine 'why' these two have been characterised or symbolised in different appearances of urban patterns.**

2.2.1. The Symbol of Symmetric Centre

Back to our concern, centre and centrality in urban structures, one of the 'dominant metaphors' of our time, is obviously first of all the **geometric static concept** (Strassoldo, 1976; 1980, p. 27; 1981, p. 71; see also Gottman, 1980, p. 11) which its diffusion through Western thought can be traced back to the very fountainhead of the mathematical-geometrical imagery in their philosophical tradition, i.e., Plato. Plato described the universe as a circle, although of course the notion is present in many, perhaps in most cosmological traditions all over the world. Strassoldo (1981) explains: "The notion of a circular pattern, mirroring the parallel organization of the Kosmos, structured in concentric circles, seems to be the most typical element of the platonic tradition." Also Jung (1976) maintains: "... the 'mandala' figure

(the word mandala itself comes from Sanskrit, and means 'circle') is one of the most persistent archetypal themes" and that "it was figuratively engrammed in the collective unconscious" (Figure 2.4).

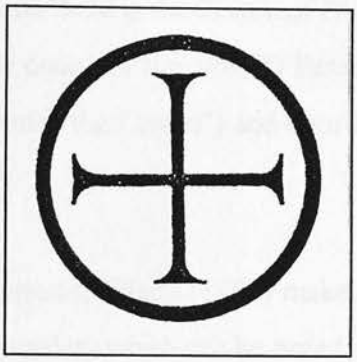


Figure (2.4) The Mandala Theme (Sourse: Smith, 1975)

One of the most archaic ideograms is the Neolithic Sun Wheel. The circle is the symbol of the sun, of life, of enlightenment, of the self, of the 'totality of life', of the union of opposites, of human and universal perfection. The 'mandala' is one of its more universal and sophisticated expressions. They can be found also in Europe, in the rose windows of medieval cathedrals, in the haloes of saints, and in the ground plans of temples and cities (Jaffe, 1976).

Elaide (1969) notes: "Mandala means circle: the translation from the Tibetan sometimes render it by 'centre' and sometimes by 'that which surrounds'" (p. 52). Strassoldo mentions mandala is a class of visual archetypes of the most subtle and elaborated cultural meanings; they express cosmological myths produced along thousand of years in a wide culture area. They are basically patterns of concentric circles and other figures, variously complicated in size, colour, textures, and additional elements. He says: "They are circles, and therefore can be conceived as points, as (enlarged) centres; in addition, they have centres, but they also *have* a periphery, a boundary line marking them off the environment, the field" (1980, p. 28).

All archaic cultures, Eliade (1969) assures us, have been fasinated by the symbolism of the centre, to which that of the circle is closely associated (the circle is generated by a centre). It is mentioned by Strassoldo (1980) that: "Centre and circle mean symmetry, proportion, and perspectives." He has traced the 'metamorphoses of the circle' in Western culture, beginning with Plato:

> "It was elaborated upon by the Neo-Platonic school of Plotinus, Proclus, and others, who spoke of the world as a circle, and of the centre as its "cause", i.e., God. It was taken over by the early Christian philosophers, who called God the Centre, and revived in the Renaissance by Marsilio Ficino (the "Soul is the Centre of Nature") Pico della Mirandola ("God has placed Man in the centre of the world") Paracelsus ("All universe surrounds Man, as the Circle surrounds the Centre") and Giordano Bruno ("The Soul is a sort of Circle")" (Ibid., p. 28).

Drawing from his studies of non-western cultural systems, Eliade (1969) makes two basic points. The first concerns the dialectics of centre and boundary which can be noted, in passing, that it refers to: (a) biological sacredness, a metabiological theory of animal needs and the functions of territory (Ardrey, 1966); and (b) the sacred loci of identity and security of every human being and so every society.

As it is noticed by Strassoldo (1980), according to the second one there are examples of different kinds: cosmological, a *boundary* between *cosmos* and *chaos* (Eliade, 1969, p. 37); sociological, a *boundary* between *ingroup* and *outgroup* (C. Cooley); psychological, a *boundary* between *external enemy* and *inner side* (G. Simmel; C. Schmitt); and psychoculturological, a *boundary* encircling the individual self as well as whole societies that every level of social organization is marked off from its environment. The strongest one is usually found at the level of cultural area or civilization, and almost as deep are the political systems in the age of nationalism and so on. It is added by him that the second also concerns:

> "... every human being tends, even unconsciously, toward the Centre, and towards his own Centre, where he can find integral reality - sacredness. This desire, so deeply rooted in man, to find himself at the very heart of the real at the Centre of the world, the place of communication with heaven explains the ubiquitous use of the 'centres of the world" (p. 54).

This basic point however is wholly symbological. Eliade (1969) has mentioned: "The most widely distributed variant of the symbolism of the Centre is the Cosmic Tree, situated in the

middle of the universe, and upholding the three worlds upon an axis" (p. 44). In the same vein Strassoldo (1980) has noted: "Most cultures have a three and four-dimensional image of the world. The earth might be flat, but the cosmos is a sphere or a set of spheres, and the centre of the world is usually the point of intersection between heaven, earth, and hell" (p. 30).

This myth can be found in ancient India, China, and Germany. Elsewhere we find cosmic mountains, towers, pols, or mounds. But, moreover Strassoldo (1980) has described that one of the most familiar and elaborated of such three-dimensional concentric cosmologies is the medieval European, for instance, in Dante's works: "The centre is not only three-dimensional; it is also often dynamic. It is the growth centre of the universe, from which it was created".

The metamorphosis trace of the circle in Western culture, as Strassoldo (1981) has mentioned, and also Eliade's two basic points are the philosophical underpinnings of two basic characteristics, *perspective* and *symmetry*. In particular perspective, which is one of the highest achievements of European art, is a glorification of the centre. However, the author has already mentioned the importance of these characteristics. What remains to be analysed are its roots.

They are to be found in the Pythagorean religion of numbers and forms, where the circle has a prominent place as the image of divine perfection, self-sufficiency, incorruptibility, harmony, and the like. In this relation Ardalan et al. (1973) explain that traditional[1] man views all creation as an emanation from the One, and proceeds on the revelation that he shares with nature a commonality of structure and proportion that is quantifiable through mathematics. Conversely, all of the creations of man and nature are viewed as forms observable through mathematical laws of similitude, symmetry, and geometry. The beauty observed in a snow crystal depends as much on its geometrical order as on its ability to reflect a higher and more profound order (Figure 2.5). It follows that all shapes, surfaces, and lines are arranged in conformity with the proportions inherent in nature and reflect ideal systems of beauty. They state:

[1] Person who follows or supports ancient tradition.

"Shape results from the delimitation of structured space. Numbers are the units of this spatial definition, and geometry expresses the 'personality' of these numbers. Through the use of numbers and geometry, as mathematical expressions, the creation of shapes recalls the Archetypes. Mathematics, then is viewed as the language of the intellect, leading from the sensible to the intelligible world. Mathematics is an abstraction with respect to the senses, even though concrete in its Archetypical self. These abstractions from the intelligible world serve as a basic guide to the eternal and concrete essences that reside in the Divine Order" (p. 21).

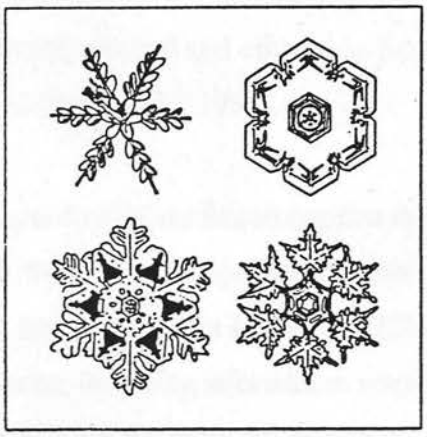


Figure (2.5) Geometric shapes in nature, such as snowflakes, show laws of similitude, symmetry and geometry.

But after all, is there something less symbolic beyond the meaning of centre? Just why should the circle carry such meaning and exercise such fascination on human beings? Are there biological, psychological, or sociological bases to it?

2.2.2. The Order of Symbolic Centre in Urban Patterns

It is possible that the focus on the centre is not only a symbolic trait, but is rooted in some biological universal; experiments in visual perception do seem to support the theory that we tend to organize impressions around centres; or at least that is the way we try to represent them on paper (Howard, and Templeton, 1966). Before perspective was discovered and developed, paintings had a plurality of focuses. With perspective, the whole image came to be dominated by a single centre. The serviceability of this artistic-scientific world view to

autocratic theories and ideologies is obvious. It is noted by Mumford (1961) that: "The convergence of all lines to a single point, from which everything is measured hierarchically by distance, was glorified in the Baroque city and had its culmination in Versailles, the prototype of innumerable such incarnations of despotic, *central* governments".

Symmetry and centrality are also a basic feature of the Mandala, the basic pattern according to which cities were designed in most ancient empires, in Europe as well as in India, Indo-china and China. The relationships between the Mandala, the 'symbolism of the centre' and urban ground plans have been thoroughly explored by E. Cassirer[2] (1953). The association of centripetal urban design, symmetry and perspective with central power accounts also for their rejection by anti-authoritarian movements, cultural and otherwise, from Romanticism to our own days, as H. Sedlemayr[3] has noted (Strassoldo, 1981).

Leaving this for a moment, recent neurophysiological studies strengthen the belief that visual perception engages the brain at all levels. What is most significant in this context is that the limbic brain has its own 'primitive' optic system. Norman Dixon[4] (1972) claims that "at an early preconscious stage in cerebral processing, incoming information actually makes contact with memory systems... sensory information can be received, classified, and responded to without ever becoming conscious".

The limbic brain therefore has highly developed powers of perception and can make 'complex discriminations' (Ibid.). What is most important here is that it perceives according to primitive rules. These criteria are very likely to include a predisposition to respond to configurations of space and light which strike an archetypal chord. Because the primitive optic system 'sees' before the classical system, its mode of response can condition the conscious reaction of the neocortex. That is the reason why this subject is of great relevance to anyone involved in urban patterns.

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[2] Cassirer, E., 1953, *THe Phylosophy of Forms*, Vol. 11, New Haven.

[3] Sedlmayr, H., 1948, *Das Verlust des Mitte*.

[4] Dixon, N., 1972, "Who believes in subliminal perception?", New Scientist, February 3.

More explicit, the author refers to Smith's (1975) explanation that symbolism is the vehicle of human development: "It enables man to come to terms with his situation by creating artifacts on to which he can project his needs: ideal objects with which he can identify". Evidence to this power of symbolisation goes back at least 30,000 years, judging by the reliefs in the Altimira caves. But the great symbolic leap forward followed from the 'invention' of agriculture, necessitating a settled and heavily defended existence. This revolutionary change appears first to have been manifest in Jericho. As Smith says:

> "In this prototype city, man first elevated and expanded the ancient programme of symbolism to the level of a whole urban artefact.... As urbanism develops in scale and sophistication to produce such miracles of achievement as Sumer and Babylon, the symbolic programme likewise becomes more elaborate and all embracing" (p.161).

Joseph Rykwert[5] has described how the inauguration of a city was a solemn religious occasion which has the effect of uniting the citizens with the universal order: "The city was conceived and planned as a diagram of the cosmos, and the diagram usually consisted of variations on the mandala theme". It is interesting to note that the mandala figure was one of the most persistent archetypal themes which emerged from Jung's (1976) case studies. He became convinced that it was figuratively engrammed in the 'collective unconscious'. The mandala symbolized many things, particularly the unity between earth and heaven, the circle representing the dome of heaven, and the earth being the enclosing square. The two axes symbolized unity and the reconciliation of all opposites (see Figure 2.4). As Aralan et al. (1973) have noted:

> "The most significant expression of the interaction of the circle and the square in traditional art is the mandala or cosmogram, which has been represented in many forms throughout the cultures of man. As the reflection of the cosmos and the cosmic processes within all things, the mandala works through numbers and geometry, beginning with Unity, moving through the theophany, and coming back again to Unity.

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[5] Rykwert, Joseph, *The Idea of a Town, an extract from Forum*, van Saane, Hilversum, London.

> It recapitulates at one and the same time the permanence of Paradise as an idea and its impermanence as a temporal reality. In esoteric terms it evokes the mystic's submission in the most profound sense of the word - a surrender of 'Self'" (p. 31).

Different cultures elaborated on this theme, and highly complex diagrams originated in India. Dimensions were multiples of mystical numbers. The magic of numerology pervaded all civilizations from Sumerian times and probably originated long before Sumer (Smith, 1975). As to the drawing of a mandala, Tucci (1969) has stated:

> "The drawing of a mandala is not a simple matter. It is a rite which concerns a palingenesis of the individual and in whose details this individual must participate with all the attention demanded by the importance of the result to be obtained. An error, an oversight, an omission render the whole operation useless. And this not because (as in all magical and ritual acts) precision in word and deed guarantees success, but because any defect is a sign of inattention on the part of the consecrator and indicates that he is not working with due concentration and absorption. So, there would be lacking the psychological conditions by which, in his spirit, the process of redemption is produced" (p. 38).

Hence, "underlying the physical structure of the Newar township [in central Nepal] is an ancient architectural theory which merges religious belief with design practice (MacFadyen, and Woodworth Vogt, 1977, p. 307). It prescribes explicit codes for the construction of palaces, temples, cities and domestic dwellings, in accordance with Hindu beliefs before the time of Christ" (Ibid.). As MacFayden et al. (1977) have explained:

> "These instructions, really a sort of book of revelations, are insights into the relationship between earth and universe which have been recorded in sacred texts. The text reveal the theory's detail: astrological predictions direct siting and timing of construction; mandalic patterns define the divisions between sacred and unpure space; various spiritual characters have specific powers over design" (Ibid., p. 308).

For a Newari person, therefore, the city was a mandala. Physical and mythic space interrelated and entwined each other. The diagram hence represented a symbolic condensate of the entire universe, so the city built to its rules represented a microcosmos. Smith (1975) has also noted: "It is likely that a type of mandala was the basic figure used in the planning of high Gothic cathedrals, themselves a compressed city, prefiguring the New Jerusalem.... As late as the Renaissance there was a spate of cosmological cities based on exactly the same system" (p. 161).

Now, referring again to the Sumerians, Moholy-Nagy (1968) believes: "Sumerians' specific brand of urban piety consisted of the claim to have created a microcosm on a par with the galaxies. The construction of a ziggurat... established a city state at the dead centre of earth and sky.... Man at the centre of the universe was not a geographical fact but a [philosophical] truth." In fact, as Ardalan et al. (1973) note: "the development from innate or unconscious systems of order to those based on geometry was a conscious process. The purity and perfection symbolized by geometric symmetry were contrasted with the world of human imperfection in static compositions which gained vitality through the understood relationships of hierarchically placed symbols" (p.85). In these cities, as Moholy-Nagy has noted: "purely geometric plans generated strong lines that recognized no earthly deterrent" (1968, p. 58). Even "if the terrain made the execution of a perfect circle difficult, so much greater was the sense of accomplishment once it was realized" (Ardalan et al., 1973).

Regular geometric plans were generated from a centre which, in the ancient Middle East, most often became the locus of the sacred mountain, upon which stood the stele associated with the 'axis mundi' and the temple of the dieties. The earliest recorded urban settlements with such characteristics were those of the Sumerians, who flourished in Mesopotamia during the fourth millennium B.C. The city of Urk, built upon a natural tall (3000 B.C.), was centred on a 'world mountain' or ziggurat, upon which stood the Appearance Temple, where the high priests communed with the gods (Moholy-Nagy, 1968): "The dwellings of the populace surrounded the sacred centre, seeking by this association both spiritual and physical security" (p. 42). Such concentrically organized cities are also evidenced on the Iranian plateau by the Elamite civilization, which constructed the monumental city and ziggurat of Tchoga Zanbil

in 1250 B.C. (Figure 2.6). In this relation Ardalan et al. (1973) have noted:

> "These form giving, geometrically organized cities incorporated the following concepts, which established the basis for subsequent urban settlements: a strong sense of centre; elevation upon a great socle; contrast in scale, material, and colour with the surroundings of the centre and the identification of these forms and relationships with cosmic laws" (p. 85).

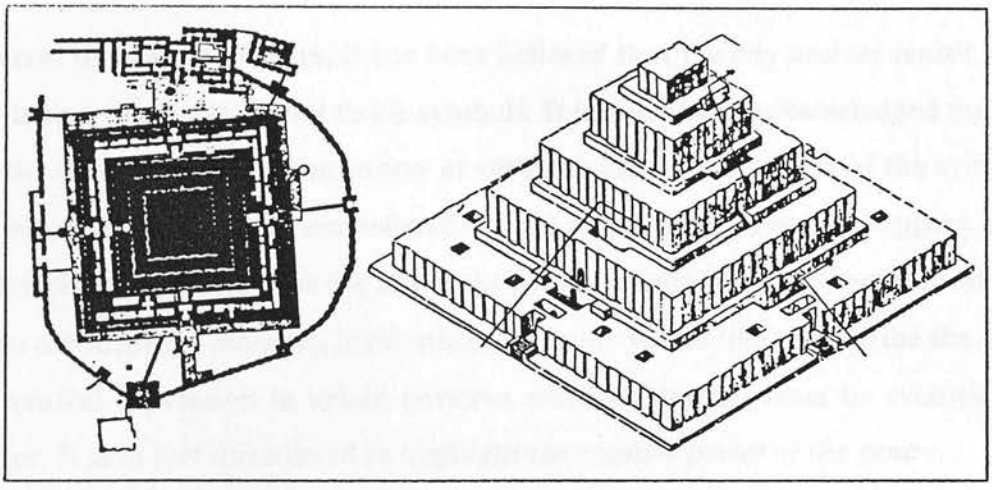

Figure (2.6) Tchoga Zanbil (1250 B.C.), Plan and Isometric (from Ghirshman, Tchoga Zanbil, Vol. 1) (Source: Ardalan et al., 1973)

But, anthropologist and theologian Mircea Eliade (1961) has expressed that the central symbolism of Sumer had a much wider application: "Every oriental city was standing, in effect, at the centre of the world. Babylon, was Bab-iliani, a 'gate of the gods', for it was there that the gods came down to earth. The capital of the ideal Chinese sovereign was situated... at the intersection of the three cosmic zones - heaven, earth, and hell." This same programme was also dominant when medieval architects placed their cathedrals at the highest point in the town. As Smith (1975) has noted: "Chartres offers an interesting case of continuity, since its elevated site has religious associations going back to prehistoric times" (p. 161). Also other great 'centre' symbols are Liverpool Anglican cathedral, built on a high outcrop of rock above the city, and the nearby Catholic Metropolitan cathedral - an almost literal interpretation of the 'world mountain' (Ibid.).

2.3. The 'How' of Central Expression - Flow, Form and Symbol: The Evolutionary Centre

The study so far examined (1) the role of the 'centre' and 'circle' in describing the nature of different appearances of natural patterns; and (2) the role of the symbol of the 'centre' and 'circle' in describing the nature of different appearances of urban patterns. In fact, for describing the symbolic genesis of the centre in urban patterns, the study first examined *the symbolic meaning of the symmetric centre*, and second *the order of the symbolic symmetric centre* in different urban appearances.

For several thousands of years, it has been believed that the city and its centre is the place where man comes closest to his symbols. It has been the acknowledged meeting place: the place of ultimate encounter or ultimate ideal. At the apex of the symbolic 'world mountain', the high priest enlisted the aid of the superpowers in support of the collective planning strategy or the aid of the ideals in support of the needs: ideal with which he can identify. Therefore, in this stage, **the study would like to describe the 'how' of the central expression in urban patterns which is derived from its evolutionary character. It is in fact questioned to highlight *the creative power of the centre*.**

2.3.1. The Creative Power of the Centre

The crucial question is, does all this evidence have any bearing on the contemporary situation? A truly twentieth century man might be quoted in his belief that man has now come of age and has no need of the ancient religious and symbolic support systems. But the whole point is something else. In fact, in the more general sense it can be argued that ancient symbolic theme of centre expresses itself as vague, nonverbalized need: it is part of the way of seeing of the limbic primitive optic cortex. The point is that the symbolic order of the centre has the capacity to manifest other symbolic orders within itself. This relates metaphysically to the Quranic verse, note Ardalan et al. (1973): "He is the First [*Awwal*[6]] and the Last [*Akhir*[7]] and the Manifest [*Zahir*[8]] and the Hidden [*Batin*[9]] and

[6] al-Awwal: The first, one of the 99 Names of God in Quran.

[7] Akhir: The Last, one of the 99 Names of God in Quran.

He knows infinitely all things (Quran LVII, 3)." Also: "The First is the origin of all things, 'the Principle inasmuch as It precedes Manifestation'; it is birth, the beginning, the Centre, and the point. The First is the Paradise one wishes to recapture and the knowledge of man in his primordial state" (Ibid., p. 31).

The First can only be understood through the Manifest; "the Principle 'externalizes' Itself through Manifestation or Existence" (Ibid.), the manifestations of creation without reference to birth or death, as elements of time. It is noted by Ardalan et al. (1973) that: "As the Manifest is a spatial externalization, so man begins his intellectual search by relating to space. This relation must of necessity be structured so that the intellect may function and not dissipate. The mandala as a symbol of emanation and reabsorption provides this structure." Whereas the Manifest is a centrifugal concept - emanation, the complement of the *ayat*[10], the Last and the Hidden - is a centripetal concept. Also: "It is at the centre from which the First began that the Last is found. The Last is a temporal externalization, death and the reintegration with the Divine. The Last is the One to whom all returns" (Ibid.):

The Point appeared in the circle and was no; may, that
Point produced the circle.
The Point in its revolution becomes a circle in the eyes
of him who measured the circle.
Its beginning and end joined together when the Point
measure the completion of the circle.
When the circle was completed, the compass put its
head and feet together and rested.
We are all without Being, without Being; we are without
Being and Thou art Existent.
I called the whole world His dream: I looked again, and
Io, His dream was Himself.

Sayyid Nimatullah Wali[11]

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[8] al-Zahir: The Manifest. Al-Zahir and Al-Batin are two of the Names or Archetypes of the Divine by which He mentions Himself in the Quran. The name al-Zahir indicates that He is identical with all existing objects; the name al-Batin that He is non-existence externally.

[9] al-Batin: The Hidden. See al-Zahir.

[10] ayat: Sign, miracle, verse of the Quran.

[11] Sayyid Nimatullah Wali (FiFteenth Century). In Browne, *A Literary History of Persia*, 3:471 (Source: Ardalan et al., 1973)

The path to the Hidden begins at the centre, manifested in man by his intellect which is veiled by his ego: "It is only by rending the veil that the mystic will be able to find 'Self', the inward or absolute mature of pure Intelligence known only through discernment and contemplative concentration" (Ardalan et al., 1973).

For most of us, self-consciousness is still limited to the perception of our physical bodies, and even then, the greater part of our actions have become automatic. Purce (1974) explains nicely: "Certainly we have forgotten the depth of meaning behind the dance. Yet in spite of this, it is perhaps through the physical movement of our whole bodies that the spiral path may be most real to us. Every time we 'turn' or circle, in the movements for example of Scottish dancing, we are activating the inner energies and their cosmic counterparts" (p. 31). We read in an early Christian Gnostic text, the Apocryphal Acts of St John, that Jesus led the Apostles in a hymn to the Father; its extraordinary rhythm and hyp-notic quality vibrate through the words of St John (Ibid.):

> *And we all circled round him and responded to him: Amen...*
> *The twelfth of the numbers paces the round aloft, Amen...*
> *To each and all it is given to dance, Amen...*
>
> *Purce*

That this was an initiatory spiral, a progressive attainment of the Knowledge, is clear in the words of Jesus, who says: "Even the passion that I revealed the thee and the others in the round dance, I would have it called a mystery." Even, the winding upwards to the peak of full understanding is the seven-fold path of the Muslem round the Ka'aba, the goal of his pilgrimage to Mecca. As Purce has noted: "The origin of the word *tafa*, the Arabic name for this circumambulation, means 'to attain the summit of a thing by spiralling round it'. The centre, the square stone of the Ka'aba, is the 'Temple of the Heart' and the world Axis. The windings are like the turning of the Buddhist Wheel of Dharma: the revolutions of the cosmos seen as the Immutable Divine Law."

Hence, "since the pilgrim spirals round the Ka'aba as the heart of the universe, it is also his own heart; and so the vortex being created is that of his own receptivity, which is matched by

the descending vortex of Divine revelation" (Ibid.). Ibn Arabi in his *Meccan Revelation* (1901) described his gradual ascent through the seven spheres of the Self - the heavens, planets or Divine attribute - until the angel who accompanied him said suddenly: "I am the seventh degree in my capacity to embrace the mysteries of becoming.... I am Knowledge, the Known and the Knower; I am Wisdom, the Wise man and his Wiseness."

2.3.2. The Place of Symbols in the Centre

In a sense, like all existence on the descending scale of realities, the circle is a symbol. Because we necessarily conceive infinity in our own, and therefore finite, we are forced to limit the limitless. It is only by imposing limits that we can make infinity accessible to us. Because any description of the Absolute must be limited, we are able to reveal it only by using symbols. The function of symbolism is to go beyond the 'limitation of the fragment' and link the different 'parts' of the whole. Following examples show how different cultures have expressed their concepts of the 'whole' by means of symbolic worlds and images. The study would like to comment on how the notion of centre is a common theme in them.

Purce (1974) has noted that the universe and man's consciousness (the macrocosm and the microcosm) consist of a continuum and a dynamic whole. Every whole is cyclic, and has a beginning and an end. It starts from a point, expands and differentiates, contracts and disappears into the point once more. Such a pattern is that of our lifetime, and may well be that of our universe. Only the time-scale has changed. But, here the point is that the right way back to the beginning is by going on. As also Tao Te Ching says:

> Going on means going far,
> Going far means returning.

To go back would be to go against the order of things. As Purce explains: "**There can be a return to the centre only if there was first a departure from it, just as there can be no contraction without expansion. As one leads to the other, the initial expansion and exploration of the developing being is checked by its return from unlimited dissipation into the infinite**. Thus delineated, the 'ego' is contrasted with that which is outside the boundary, a God transcendent, and returns to dissolve its own delineation, to find God within

and immanent" (p.16).

The goal is at once a perfection of and a release from the self. Although these can be two distinct, it is also through the knowledge necessary for perfection that there is a release. Purce notes: "The annihilation of the self in God, which is the eastern goal of Nirvana, is also the release from the coils of Maya or illusion, the rounds of existence, and hence the passage from the spiral on to the central axis - the Centre in the midst of conditions - which is also the realization of the source in one's own being":

> *For what the centre brings*
> *Must obviously be*
> *That which remains to the end*
> *And was there from eternity.*
>
> *Goeth*[12]

Lama Govina (1961) shows the development of consciousness as a double spiral: "Moving outwards from the centre, from an original unconscious unity like that of the child, its development gets progressively differentiated towards the periphery, which represents the usual surface-consciousness and maximum of differentiation. This is the turning-point and the start of the inward spiral towards the centre, towards the *conscious* unity of the enlightened" (Figure 2.7).

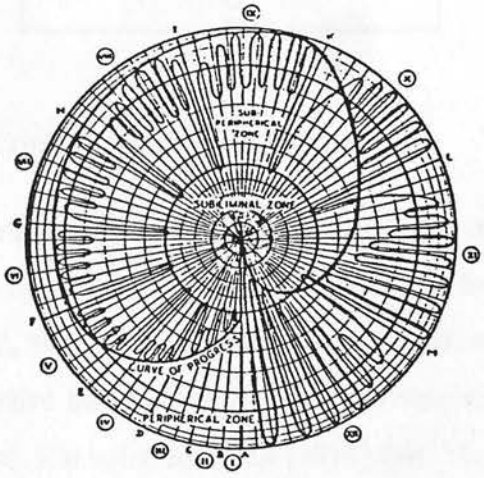

Figure (2.7) The Development of Consciousness as a Double Spiral (Source: Govina[13], 1961)

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[12] Goeth, Westostlicher Diwan (Source: Purce, 1974)

[13] Govina, 1961, *The Psychological Attitude of Early Buddhist Philosophy*

On some paths the centre is dissolved; on others it has, by virtue of sheer perfection and knowledge, become transparent. In the Hindu tradition, the centre is called the 'Diamond Body': "This still point, free from the emotional turmoils of everyday existence, is described as something indestructible and unchangeable" (Purce, 1974, p.16). It is mentioned by Govina (1961) that the 'diamond spectre' in the Buddhist tradition, is the symbol of the highest spiritual power. He states: "It shows the original point, Bindu, containing its potential spiral unfolding (I). Although never moving from its central position, the point unfolds (II, III) and becomes the central axis - the polarity and union of opposites - surrounded by the petals of the four directions.... The spiral at the centre is both the original subjective knowledge and the gained by the balancing of opposites (of subject and object)" (Figure 2.8).

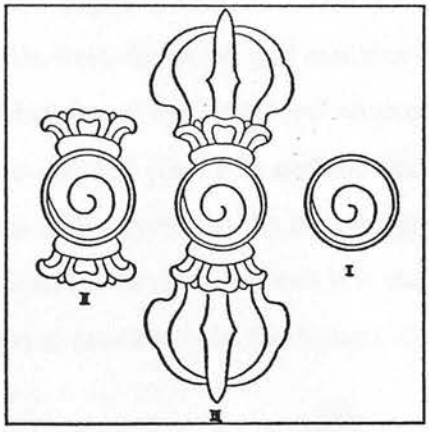

Figure (2.8) The 'Diamond Spectre' in the Buddhist Tradition (Source: Govina, 1961)

The diamond spectre (like Figure 2.10) thus shows the primordial unity of consciousness, its outward path to the periphery and its return to the centre. In other tradition it is the 'Rock of Living Waters', the 'Ka'aba of the Heart', the 'Philosophers' Stone', the 'Stone of Sure Foundation', the 'pearl' or 'jewel'. The centre hardens, its transparency increasing, until, indestructible, it has the clarity of the diamond. It is noted by Purce (1974) that: **"Seen on the spiral our journey can begin in infinity and move inward to the centre, the concentration of infinity into a point. Infinity is thus reached through a process of ordering and concentrating. The One which is everywhere can be found in the centre of being: a concentration of the One as everywhere into the One as centre"** (p. 16).

This organization and concentration is implicit in the diamond, whose constituent carbon atoms, while the same as those of graphite and of coal, have here reached a state of maximum order and perfection. It is the clarity gained by such an ordering that is the goal[14]**. The journey which begins in transparency, at its most fluid in the unformed water, comes to its final transparency in the perfection of the diamond.**

So since space is manifest it cannot be infinite. Ch'uang Tzu has explained: "**The point, which is the pivot of the norm, is the motionless centre of a circumference on the rim of which all contingencies, distinctions and individualities revolve.**" And then Purce (1974): "**This point, being non-manifest, is total possibility, and contains - just as unity contains multiplicity - an infinite potentiality of manifestation, duration and extension. Since this potential extension is in all directions, the point is central.**" Therefore, the universal spherical vortex can be seen as that which issues from the point, and contains it: "It conforms to the whole conception of the point as that which issues from itself and returns to itself, while still being nothing other than itself, which is yet All" (Ibid.). **It defines that centre is the place of all symbols**. Bakhtiar (1976) states about 'symbols': "**It is through symbols that one is awakened; it is through symbol that one is transformed; and it is through symbols that one expresses. Symbols are realities contained within the nature of things.**"

In fact, **the entire journey in Knowledge is a journey in symbols, in which one is constantly aware of the higher reality within things: symbols refer to both the universal aspect of *creation* and the particular aspect of *tradition***. Everything in creation is a symbol: "For everything perceived by the *outer* senses may conceived through the *inner* senses as a sign of a higher state of reality. **However, this symbolic vision takes place only when the symbol is seen through the inner meaning of practices with the Eye of Certainty, and reached the centre to gain the Truth of Certainty**" (Ibid.). As she expresses: "**man cannot create symbols: he is transformed by them.**"

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[14] While colourless, the diamond contains all colours; while it can cut anything, nothing can cut it. Considering in the same atoms as coal or graphite, the diamond demonstrates the transformation of a substance from a state of disorder to one of supreme order and clarity.

Therefore, **it is through seeing symbols that one continues to remember, to invoke. So, they are vehicles of transmission, which transform us by carrying us to the higher states of being from which they originate. They are the place of encounter between the world of Archetypes or intelligibles and the sensible, phenomenal world.** Bakhtiar states (1976):

> "The world of symbols is a reflection of the world of Archetypes. It gathers these universal essences and then reflects them down upon this world. The further a thing moves away from the intelligible world of illuminated knowledge, and the closer to the sensible world of phenomena, the more particularity it outwardly exhibits. Its universal essence moves inward, into a state of potentiality."

That is why the place of symbols is in 'the centre' and the author would like to comment about what the observation emphasized on it. The study examined how centre is the proper place which maintains the permanency and continuity of symbols. Centre relates to the whole of life. It repeats, recalls, and recollects the Ideas or Archetypes. It preserves the universe of forms, ideas and institutions. In fact, the forms appear in art and in the crafts; the ideas are reflected, expressed and recalled in the intellectual development of the tradition; and its institutions retain the forms and ideas for future generations. Therefore, continuity is not simply a horizontal line of human history. Continuity pierces the horizontal line with the vertical axis of revelation, and thereby relates the centre to a transhistorical time.

2.4. The Centre as Symbol and Symbols in the Centre

So far, **the study has realised 'why' *symbolic meaning of the centre* is ordered in *symbolic centre of the urban patters*. It has also remarked the way symbols are placed in the centre, or 'how' *the place of symbols is in the centre - the creative power of the centre*. Now, the author would like to characterise the ideal idea of the centre when these two are united: *'the container centre'* and *'the centric contained'*. It emphasizes how centre as a symbol could possibly contain other symbols.**

2.4.1. The Container Centre and the Centric Contained

"Symbolization arises from the need to give perceptible form to the imperceptible" (Giedion, 1966, p. 78). Although Giedion is speaking on symbols in general, his words are quite relevant to this chapter which concentrates upon the symbolic content of urban patterns.

The existence of symbols, noted by Ardalan et al. (1973), follows the inverse analogy of "that which is highest is reflected in that which is lowest"; that is, "the lowest or material world reflects not only the world immediately above it but the world of the spirit, which stands at the highest level in the hierarchy of being below the Source, the Origion." Symbolic forms, which are sensible aspects of the hidden reality of things, exist whether or not man is aware of them. It has been noted by Nasr (1964) that: "... the nature of the symbol differs profoundly from that of allegory. A symbol is a 'reflection' in a lower order of existence of a reality belonging to a higher ontological status, a 'reflection' which in essence is unified to that which is symbolized, while allegory is a more or less 'artificial figuration' by an individual having no universal existence of its own" (p. 263). Also Corbin[15] (1969) notes the difference:

> "Allegory is a rational operation, implying no transition either to a new plane of being or to a new depth of consciousness, of what might very well be known in a different way. The symbol announces a plane of consciousness distinct from that of rational evidence; it is the 'cipher' of a mystery, the only means of saying something that cannot be apprehended in any other way" (p. 14).

It is argued by Ardalan et al. (1973) that there are two fundamental kinds of symbols: 'natural' and 'revealed', or 'general' and 'particular'. Natural symbols, such as the processes of nature, form certain systems of order that are symmetrical or rhythmical, or both. They point out man, through his art forms, emulates these orders by creating geometric forms which are symmetrical with respect to their centre and which symbolize 'unity within unity'. This concept of centre has been expressed architecturally in many ways, i.e. the Sacred Mountain which is situated in the centre of the world, as well as the palace or altar placed in the centre of the

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[15] Corbin, Henry, 1969, *Creative Imagination in the Sufism of Ibn Arabi*.

city[16]. Revealed symbols, in contrast, are particular symbols that have been sanctified by different traditions of the world and that vary according to the language and form in which they are revealed. It will be more discussion about these kind symbols within Iranian Islamic urban tradition in Chapter (5).

It is with the help of the achieved truths, that man seeks to take symbols back to their origin. Through ritual in structured art man is able to refer the symbol to its origin. The art form as container is created through objective laws, but, its contained subjectivity is a symbolic recapitulation of its Archetype. Therefore, it is acceptable that man with a special vocation seeks the Truth through the Way that exists as the inner dimension of the Law. The relationship between the Truth, the Way, and the Law is best expressed through the symbol of the circle (Figure 2.9). As Ardalan et al. (1973) explain: "The Law is the circumference, the Way is the radii leading to the centre, the centre is the Truth. It is with the radii that this study begins, although it keeps in mind that they lie between the Law and the Truth, that without the circumference there would be no Way, and that without the centre there would be no Truth" (p. 5). **This again represents the place of symbols in the centre. The Way permeates both formal sciences - instrumental principles - and the crafts - symbolic principles. In fact, art comes into being as a result of the wedding of these two.**

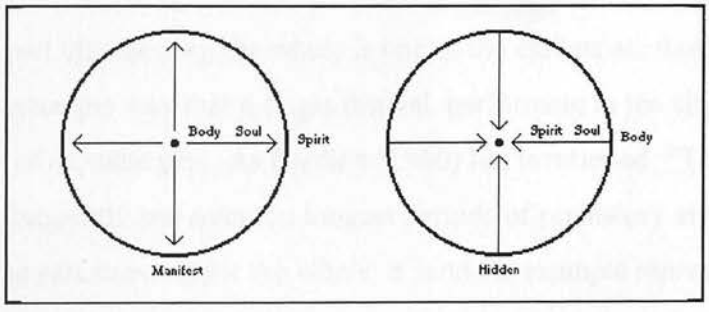

Figure (2.9) The Relationship between the Truth, the Way, and the Law through the Symbol of the Circle (Source: Ardalan et al., 1973)

The central postulate of the Way is that there is a hidden meaning in all things. "Each thing

[16] see Eliade, *Cosmos and History*, 1959, pp. 12-17.

like a symbol has an outer as well as an inner meaning. Every external form is complemented by an inner reality which is its hidden, internal essence" (Ibid.). The outer meaning is the sensible form, that which emphasizes the quantitative aspect which is most readily comprehensible, such as the shape of a building, the form of a pool, the body of a man, or the outward form of the religious rites. The inner meaning is the essential or qualitative aspect which all things possess. Therefore, "in order to know a thing in its completeness, one must not only seek its outward and ephemeral reality but also its essential and inward reality - that in which the eternal beauty of every object resides" (Ibid.).

On his forward on 'Ekistics magazine', Tyrwhitt[17] (1975) reminded us of the persistence of the notion that centre can be a place where, on occasion, the inhabitants become transported out of themselves, and for a time see everything with different eyes. He instanced the well known impact upon its inhabitants of the *Oberammergau* enactment of the 'crucifixion of Christ', or the fantastic effect of the 'Mardi Gras' celebrations upon the staid Swiss population of *Basle*, or the equally dramatic impact of the 'Clean Monday' festival on the Greek island of *Skyros*. He said: "On these occasions, the local townsfolk cast off their customary identity and become totally involved in the magic of the moment.... Functions with symbolic values provide one of the main attractions of city centres - from Easter or New Year celebrations to changing the guard at Buckingham Palace" (p. 138).

In a sense, the notion of the part representing the whole is one of the earliest attributes of the symbol. We might here instance the way that a single festival, performing in the city centre, often operates as the symbol of an entire city. As Giedion (1966) has mentioned: "The magic symbols that appear most frequently and over the longest periods of prehistory are simple. They consist of fragments, the part standing for the whole: a hand for example represents the entire human being." But, MacFadyen et al. (1977) have another idea. In their underlying the physical structure of the Newar township we read:

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[17] Tyrwhitt, J., 1975, "City Symbols: Sacred and Profane", Forward on Ekistics: The Problems and Science of Human Settlements, Vol. 39, No. 232, March 1975.

> **"The symbolic importance of the mandala is manifested and honored in the daily ritual of the Newari; a person's relationship to the sacred is not reserved for ceremonial occasions but fully incorporated into living. Ceremony itself becomes a regular household function, exemplified by the dawn procession of women from each family to shrines within the city which correspond to the temple outside. This act begins the day. The women are silent, bearing trays of boiled rice and fragrant coloured powders, flowers and votive offerings"** (p. 308).

But, this is only one image of a pattern of worship and offering integrated into the life of the Newar family, enforcing the central role of the mandala. Even the routes taken for truly ceremonial processions, especially funerals and festivals, follow mandalic paths and stop along the route to touch special protruding paving stones thought to have particular spiritual significance (Ibid.). **The reality here is in a life-style that has certain values which in turn are invested in the built environment. These values are utilized in articulating space and also creating a centre to which these values are related in some fashion. This centre refers to all structures both symbolic and solid in the process of change over time. It is not a spontaneous way of life, but a process in time**. Hence, we are concerned with life-respect and respect for the history. It is argued by Wilson (1996) who blieves:

> **"If it starts with the Greek idea of truth as something hidden that has to be winkled out - then, by definition, we are engaged in an open-ended act of discovery, and an act of enabling things to happen. This sort of architecture is deeply committed to 'examining things', and 'allowing them to discover people's own forms': it is deeply committed to the celebration of life."**

Space is never divorced from form: it is not the materialization of abstract Euclidean space which then provides a frame into which forms are 'placed'. Space is qualified by the forms that exist in it. Nasr (1973) notes: "A sacred centre polarizes the space about it just as the holy city of Mecca - which for Islam is the terrestrial point on the axis connecting heaven and earth and is therefore itself the centre of the earth - polarizes all space for the supreme Islamic rite of the daily prayers. The very existence of Mecca, toward which

worshippers turn five times a day in the daily prayers - a ritual for whose celebration mosques are mainly built - already polarizes all space and even affects in a practical manner the construction of cities" (p. xii).

The concept of qualified space, for instance, regulates Iranian Islamic architecture and provides the means for the architect to achieve unity and synthesis, to create a building or city which helps man integrate his daily movements into the centre (Ibid.). **The space that is realized in this architecture seeks either to actualize this Centre in a direct manner or to indicate it in an indirect way** (see Chapter 5). Orientation of space, its qualitative polarization, and the relation existing between space and form, which is the reverse of the relationship that is commonly believed in today, are essential elements of this architecture and a key to the understanding of its principles. In this structured space, man knows where he is; direction is meaningful to him (Nasr, 1973).

It is in fact to emphasize that the container centre should always receive the centric contained - the symbols. But, the purpose of the centre in this term should not be only to hold the symbols but also to involve them in the whole experience of life. It is indeed the only way to attain the creative power of the centre that every symbol which is contained in the symbolic centre is also involved in the centre of life itself. They are, therefore, qualified in the process of time as the symbol of the centre itself represents.

2.5. Symbolic Meaning in Contemporary Cities

There are good reasons for recognizing the existence of deep strata of symbolic needs which impinge directly on urban phenomenology, since they are, first of all, part of the visual perceptual data of the limbic brain. Our contemporary lifestyle tends to undermine personal and collective attachment to place. High-speed mobility, high-speed change, and low-impact information from communication media all operate against deep 'place relatedness'. It is no longer belonging to cities but escaping from them which is important to urban inhabitants. Some will question whether place attachment is important. Others will argue that its absence may contribute to the mounting evidence of stress within the urban environment.

The deliberate creation of urban symbols is not easy at the present time. To quote Rapoport (1975): "**Symbols in a given culture were fixed, known and shared by people and designers. A given element would always, or at least in most cases, elicit the 'right' responses - or at least within a narrow rage of acceptability**." The choices were greatly limited by the culture and these limitations accepted. This was so in primitive and vernacular situations and also in high-style design. For example Giedion (1963) has pointed out that the ancient Egyptians, although familiar with the arch and vault, only used them where they could not be seen, since they did not match the symbolism of the buildings. Under those conditions the associations were much more closely matched to forms than is the case today. Today, in the mobile and international societies of most great cities, this situation does not exist. **The urban symbols that our current world society creates and accepts tend to be commercial or 'utilitarian' - standardized signs and indicators - unrelated to any 'ideals' of urban life**. They are no lift to the spirit.

Today it is far more difficult, if not impossible, to design in the associational world since symbols are neither fixed nor shared. As a result, designers have eliminated all concern with the associational world and restricted themselves to the perceptual world. This is linked with many aspects of modern life. Eliade (1961), for example, contrasts the structured experience of space, which is shared and sacred, with the amorphous experience of space which is personal and profane. Similarly the structured experience of time is shared while personal subjective time is not shared. Shared and structured associations can be designed for, but personal ones cannot.

These conditions make the past even more precious. As Lewis Mumford says (quoted by Agena, 1975): "**The city's main task is the transmission of culture, and this requires a continuity of the features of the city that have contributed to its past history**." In outlining certain aspects of the history of urban settlements, Norman Pressman (1975, p. 169) notes how changes in the image of the city sometimes result in new symbolic interpretation, but - like Agena (1975, p. 177) and Bansal (1975, p. 185) - he deplores the wanton destruction or degradation of the architectural expressions of a former period. The fact that the majority of visitors and tourists flock to the centres of the major cities of a country is due

to a number of causes, but not least to their symbolic functions. This is something that can be used to aid in the physical preservation of what is significant in their urban past (Tyrwhitt, 1975, p. 139).

The other point might seem to have little to do with symbolism, but, essentially it is a discussion of the symbolic space in which each of us moves about within the city. This symbolic space - as Mitropoulos (1975, p. 199) calls it - is the 'anticipatory space' we mentally project when contemplating moving from where we now are to somewhere else. Our actual passage from here to there he calls 'ambulatory space', but the interesting thing is that this space is seldom consciously 'seen'. We continue to 'see' in terms of the space we already 'know' to exist - the anticipatory space we envisioned before setting out on the journey. In effect this point makes the same point as Giedion (1966): that symbolic values pervade not only the high points of our religious or emotional lives but also occur in our most everyday actions which frequently "evade a clear explanation in terms of [the logic of] cause and effect." He notes: "In considering history - even the life history of the simplest creature - we cannot help but observe how most actions evade a clear explanation in terms of cause and effect. We can always discover certain causes after the event, but we are unable to predict a future effect of a cause and its development, of which we ourselves are a part and with which our personal destiny is unremittingly involved" (p. 78).

If the built environment engages the mind on all levels, the chances of its stimulating place attachment would seem to be greatly increased. By creating form and space which speaks the 'hidden' language of the limbic brain, the mind reacts in depth, and it is the experience of deep response, which makes a place significant. The limbic system is in fact the seat of emotions, and therefore, when it is involved in a response, there is an emotional component which reinforces place relatedness. Because of this, there can be empathy between man and artefact which recovers the traditional meaning of the home town. This level of urban communication offers the possibility of contributing to social cohesion. As Smith (1975, p.163) states:

"Because the language of archetypal symbolism is primal and elemental, it has large

areas which are common to particular cultures. There is therefore a high probability that an urban configuration which has overtones of archetypal symbolism will generate a collective response. Where a large section, if not all, of the community is perceiving the environment on this level in the same way, this must contribute to the strengthening of social bonds through a communal, emotionally charged, attachment to place. The importance of this factor cannot be overstated in an age manifesting the ascendancy of supralocal media and organization which are socially counteractive".

The shared language of symbols, the communally perceived meaning behind urban phenomena, is a decisive factor in cementing the unity of the polis. Even though the language is no longer consciously perceived, it may still be 'read' by the limbic brain through its own 'primitive' optic system and so can help to achieve the goal of community integration. But, by the very nature of things, creative mental tension is inevitable. As Smith emphasizes: "The limbic brain and neocortex[18] do not *have* to be mutually opposed. Neocortex can communicate its answer to deep rooted security needs which stem from the limbic system. It can do this through shapes and rhythms which speak the nonverbal language of the brain. So, mental satisfaction will be 'vertical', from the conscious level of the neocortex to the nonconscious but equally deternimative centres of the limbic brain." This is what is meant by place relatedness in depth.

Awareness of the rhythms of the various frequencies capable of eliciting a deeply satisfying response from the deferent levels of the brain should be a prerequisite for all involved in determining the shape of the environment especially its centre. Undoubtedly, centre molds the minds of its consumers. This places a great burden of responsibility on all who participate in the design, change, or restoration of centres.

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[18] Smith (1975) has explained: Three things influence human perception of the environment. The first is experience and memory. Each individual possesses a unique schema of recorded events which modifies perception. Second, certain specific genetic factors may have a bearing on perception. Third, there are the rules of the cortical system responsible for perception.

The human responses to environment is complicated by the fact that the cortical system consists of a federation of three brains which, quite frequently, fail to coexist in harmony. The oldest brain carries the term 'paleocortex' and the next stage is represented by the 'mesocortex' brain. These two systems are sometimes combined under the term 'limbic brain'. Lastly, there is the higher brain, called alternatively the 'neocortex'.

This responsibility involves an appreciation of the many levels of perception available to the cortical system. Whereas centre creates, recalls and repeats other symbols, it is really important to have it, and keep it in a right place and in a right shape. It is itself a symbol which contains other symbols. It is the symbol of creation, maintenance and continuity.

Conclusion of Chapter 2

Firstly, the chapter describes the meaning of the concept of centrality in the structure of built environment only as a 'static' and 'symmetric' circled shape to *individuate* it as a 'geometric framework' to **'perceive'** or **'describe'** the complexity of 'urban forms'. It does not use it as a given **'conceptual explanation'** to *understand* the complexity of 'urban structures' as *non-living systems*, and even as a given **'conceptual explanation'** to *understand* the process of change in the complexity of 'urban structures' as *living systems*. In fact, it does not realize the character of the concept of centrality in the complexity of 'decision-making' to *understand* how societies do actually *function* in organizing the complexity of 'urban systems' over time. In Chapter (3), therefore, the encompassing notion will be 'urban systems' not 'urban forms' which the whole work of ***system analysis*** will be brought to bear. And also, in Chapter 4, the important notion will be the function-modelling of the process of change in the complexity of 'urban structures' as *living systems* not *non-living systems* that the whole work of ***structure analysis*** will be brought to bear.

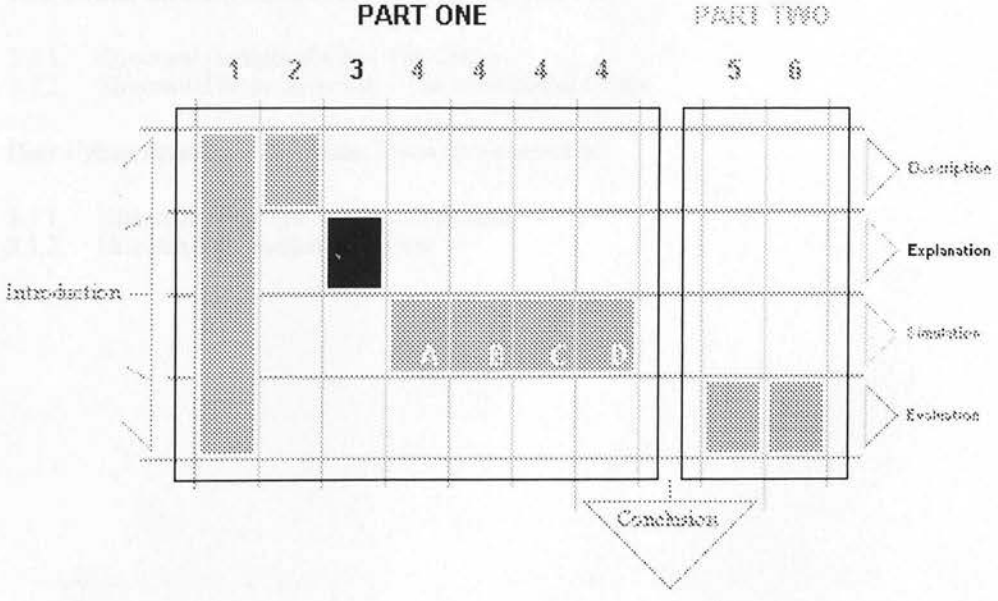
Secondly, even in terms of the complexity of urban forms, the chapter describes how *'the symbol of container centre which holds other symbols'*, and also *'the centric contained symbols which are placed in the centre'* are both important in terms of 'visual perception' and 'place attachment'. But again, it does not explain how they actually function in terms of creating symbols or even holding them.

The chapter also describes how complex forms have their own symbolic expressions: analysing the *symbolic* meaning of the centre and its encompassing notion, the circle; symbol-analysis can also be called *semiology* or, more widely, *culturology*.

3

CHAPTER THREE

CENTRALITY *and* THE STRUCTURE OF COMPLEX URBAN SYSTEMS



3

CENTRALITY *and* THE STRUCTURE OF COMPLEX URBAN SYSTEMS

EXPLANATORY CONCEPT:
Understanding the Structure of a Complex Urban System

a) **How the Structure of a Complex Urban System Comes to be; What produced it**?
Structural Hierarchy, ...?

b) **How the Structure of a Complex Urban System Operates; What its Function is**?
Functional Hierarchy, ...?

Introduction to Chapter 3

The study has already attempted the descriptive approach of the concept of centrality to give an emphasis on the meaning of centrality in the context of the complexity of 'urban forms' (see Chapter 2). Now, this chapter develops the explanatory approach of this concept which defines its character and meaning in the context of the complexity of 'urban systems'. It attempts to give a synthetic summaries of the conclusions which proceeds to the simulative approach of centrality to find its meaning in the complexity of process in the 'structure of urban systems' (see Chapter 4).

3.1. Explanation of a System - The Structure

A shape, however complex, can only be a description of an appearance; but to begin to understand a thing or a system for explaining it, we need to find out about its structure. Here, the first question would be what produced the system, what its structure is? And, the second question how its structure does operate, what its function really is?

Perhaps, the simplest kind of structure, a complex system can have, is a hierarchical chain of command, such as one finds in an army. If we make a diagram with a dot for each individual, then they can be arranged in a tree-like order, corresponding to the chain of command and responsibility. This is a very simple type of organized structure, and when we are dealing with an organization of human relationships based on this principle, it is usually quite easy to discover which level of hierarchy any person belongs to. But, he may belong to different levels in different hierarchies. For example, someone who is a private soldier in an army may also be a member of parliament, or a priest in an organised church, and, therefore, occupy much higher levels in those hierarchies.

3.1.1. Hierarchies

The concept of a hierarchy is a very basic one in considering the organization of a complex entity. We are so used to it that when we find ourselves in a social set-up which we do not understand, our first tendency is to ask 'who is boss around here?' And when we try to organize a social system of another kind, perhaps more democratic, there is often a great

tendency for it gradually to turn itself into a hierarchical system of the traditional kind in which a few people boss the rest.

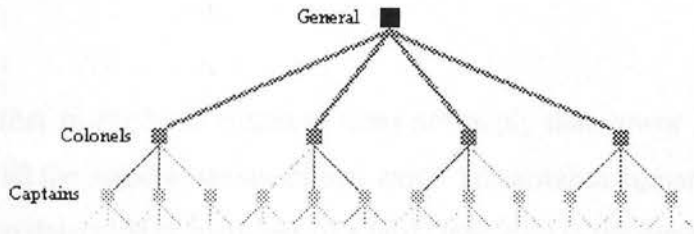


Figure (3.1) A Simple Hierarchy which Considers the Organization of a Complex Entity ('Tree Diagram') (Source: Islami, 1998, after Waddington, 1977)

It is a principle of organization which has been found very convenient in dealing with many organized systems apart from those involved in man's social life. For instance, in biology, Waddington (1977) describes, it is convenient to distinguish between different levels of operation which can be considered as levels in a hierarchical system; e.g. the ecological level which includes all the living things and the natural resources available in a certain region; the level of the individual animal, e.g. a rabbit; the level of its organs, its liver, kidneys and so on; the cellular level; and then several different sub-cellular levels.

> "If we look at all the cells in the body of an animal, we find that they fall into groups with strong interactions between those in the same group (for instance all the kidney cells in the kidney, or all the liver cells in the liver), and much less interaction between the kidney and the liver cells. We could then say that the cells were arranged in a hierarchical organization with organs such as kidney and liver forming a higher level. The cells grouped under these various organs making up the level below" (p. 50).

If one wants to ask, for instance, is a city a hierarchical organization?, one would have to look to see if one could observe important activities and interactions which fall into contrasting groups of intensity. Waddington (1977) referred to the hierarchical organization of the cities and said: "**I do not think that cities are hierarchical organized in their activities, though they may often be in their administrative apparatus.**" But, however, there is an emphasis

here that **cities are hierarchical organized** in terms of: (1) they usually present that **the focus of activities are stronger in centres than boundaries**, and also (2) they usually introduce that **the diversity and differentiation of activities differ from centres to boundaries or the revers**.

We should remember that hierarchical structure does not imply that 'lower levels' in the hierarchy are 'lower' in all the possible senses of that word. For instance, apparently some special functions may be delegated to members of a fairly low level in the hierarchy (e.g. to a colonel or a captain in an army), and he may then have full responsibility for that particular task. Again, members of a low level (e.g. dustmen or workers in a sewage plant) may carry out functions on which all the higher levels are quite dependent. **The whole subject of how a hierarchically organized human association works** (what is its strategy, what is its tactics, and who gives orders about what?) **is one of the major preoccupations of the important subject of 'Management Science', and also with refer to a hierarchical organized city is one of major preoccupation of the important subject of 'Management Environment'**.

3.1.2. Dynamic Physical Frameworks

Here in order to analyse in some depth the meaning of the concept of centrality in the structure of built environment we must switch from a **static geometrical framework** to a **dynamic physical** (ecological, biological) one; from the **history of ideas and culture** to the **analysis of real systems**; or from the **complexity of urban forms** (see Chapter 2) to the **complexity of urban systems**. **The circle is the ideogram and prototype of closed systems; but as Whitehead remarked, there are no closed systems in reality, at least under the sun. The sharp continuous line marking the circle has no counterpart in nature, where we find only border *areas*, boundary *zones*; and the innate perfection of the circle, clearly separated from the outer space, has little resemblance to reality, where every object and system is constantly penetrated by outside forces** (*contrast of domains)* **and, has a tendency to run down** *(hierarchy of domains)*, **and, in the case of living systems, reacts to them, interacts with the environment, and depends on it**.

In the case of non-living systems the centre-boundary couple (of urban hierarchy) differs from the vertex-base (of social pyramid) metaphor, also common in the social sciences, in that the latter refers to 'vertical' 'personal' 'functional' systems (classes, organizations, institutions, etc.) whereas the centre-boundary couple refers to horizontal, territorial systems; it is less abstract-cultural and more concrete-natural; less sociological and more ecological, thereby allowing for the convergence of many disciplinary perspectives (geography, economy, etc.).

3.2. How Urban Structure Comes to be; What Produced it?

There are perhaps two very great attractions in the subject. Much of the human world, now and throughout history, has been mediated via a hierarchy of cities - an idea neatly encapsulated in the one word 'civilization'. A study of city origins throws a great searchlight on the march forward of human society. Second, there is a fundamental attraction in genetic explanation of any phenomenon under study. Space navigation is a pure form of genetic deduction: "**we know where we are because we know how we got here**" (Eliade, 1961, pp. 83-91). Eliade goes further and believes that **to know the origin of something is to gain power from it, and power emanates from a centre** (see also Idem, 1964, pp. 27-38). This profound view, with its 'centre' allusion, neatly anticipates some of the detailed subject-matter that follows. Discussion of how cities can originate (and the manner in which their centres arose, and these must have come first), and how growth occurs, gives a useful hindsight through which to see problems of present-day city centres. The study briefly surveys causes of city formation over a long span of time, but emphasis is given to those studies dealing with the earliest city origins: "these were the first attempts to build notable focal centres of some permanence on the surface of the earth, and this was how the plane of thought first significantly intersected the plane of the earth's surface, which was of course thought to be a plane in the first instance" (Tuan, 1971, p. 18).

There are some propositions which should be noticed for first steps: (1) **the city must be studied ultimately in terms of its function not in terms of its form, which nevertheless may give useful evidence**; (2) **statements about origin and development ought to be explanatory and not delineatory**; (3) **the function of cities is a dependent variable and human motivation an independent variable**; (4) **in a further equation, human behaviour**

is dependent on the way the world is seen. This appears to have led us straight into one of the basic difficulties. Surely, people in various cultures have seen the world differently. It is mentioned by Piggott (1972):

> "... in the field of anthropological comparison I was very dubious about the validity of comparing some of the very disparate societies, disparate in time and space and in structure, that were instanced.... Here I find myself **unconvinced by the underlying assumption that there are unchanging or relatively unchanging patterns built in the behaviour of the hominids which express themselves in any conditions of time and space**" (p. 948). [author's emphasis]

This would put the student of centre genesis at a disadvantage compared with, for example, the geologist and geomorphologist who can adopt the principle of uniformitarianism. "The same physical processes and laws that operate today, operated throughout geologic time, although not necessarily always with the same intensity as now" (Thornbury, 1954, p. 16). The benefits of this concept can be obtained by adopting a little more generality, and asserting that the human method of confronting reality has always been the same in that the brain is basically a comparing machine which provides spatial orientation (Bird, 1977). Hall (1966, p. 99) goes as far as to say that "to be disoriented in space is to be psychotic." Bird notes:

> "**Man projects his desired world, with its centres and non-centres, on to the perceived world and then organizes the latter in an effort to gain the former, which itself is governed by the positive feedback of experience**. The elements of this association (genotype) may be very differently arranged in different cultures (phenotype), or operated with different intensity, but the **basic comparative method** always operates, giving a cross-cultural regularity" (Ibid., p. 28). [author's emphasis]

3.2.1. Structural Genesis of City - The Centre

When the subject 'origin of cities' (what produced cities?) deals not just with the earliest forms but with city-formation throughout history, the number of possible 'explanations' begins to increase, most of which are put forward as the leader among several independent variables.

Figure (3.2) attempts to summarize suggestions that have been put forward by Bird (1977), and Figure (3.3) is a rough sequence of them in a time continuum (Ibid.). In face of such variety, common sense would tell us that **in most cases a conjuncture of many variables would be necessary to produce a city on the ground**. In this case, common sense would leave us in a state of confusion in that **each city would have its own unique combination of causes**, if indeed these could ever be distinguished. Yet if the idea of 'human motivation' is retained from the earlier propositions, the various listed suggestions begin to look different from one another. The idea of defence as a first cause falls down because there must be something to defend a priori, and trade can be invoked only if the trade is at a time or place agreed a priori on other grounds, because trade does not need a permanent settlement for its prosecution.

	Examples where appropriate
- Trade - Favourable Environment - Demographic Pressure - Technological Development	- Physical Environment Determinists
- Religion (or Myth) - Markets - Irrigation - Defence and Attack - Periodic Fairs at Religious Festivals - Urban Implosion of Palace and Temple - Fusion of Fortress and Market - Idea of Social Order	- Mesopotamian Cities; Early Chinese cities - Medieval European Cities
- Proclaimed Impulse - Epiphenomenon to some other Causal Chain - Change in the Material Mode of Existence - Prestige in a Pre-market Ordered Universe - Agent of Trade	- Australian Seaport Capitals
- Break of Transport (Coastal Gateway) - Break of Transport (Inland Gateway) - Political Implantation	- U.S. and Canadian cities - Secondary Urbanization, Bastides, Medieval Burgs and Bourgs, Colonial Cities, New Capitals, New Towns

Figure (3.2) Some Possible Prime or Validating Agencies for the Origin of Cities (Source: Bird, 1977, p. 31)

In concluding it is necessary to distinguish centre-genesis from city-genesis. Some cities were planned to be the most important places in their region, and the space around was deliberately

adapted to focus upon them. Other cities may have begun as agricultural villages, at havens for ships, near a mine shaft, or at a minor node on a transport net. Subsequently, the development of the area threw up an urban hierarchy requiring a high-order centre, and such sites found themselves selectively adopted.

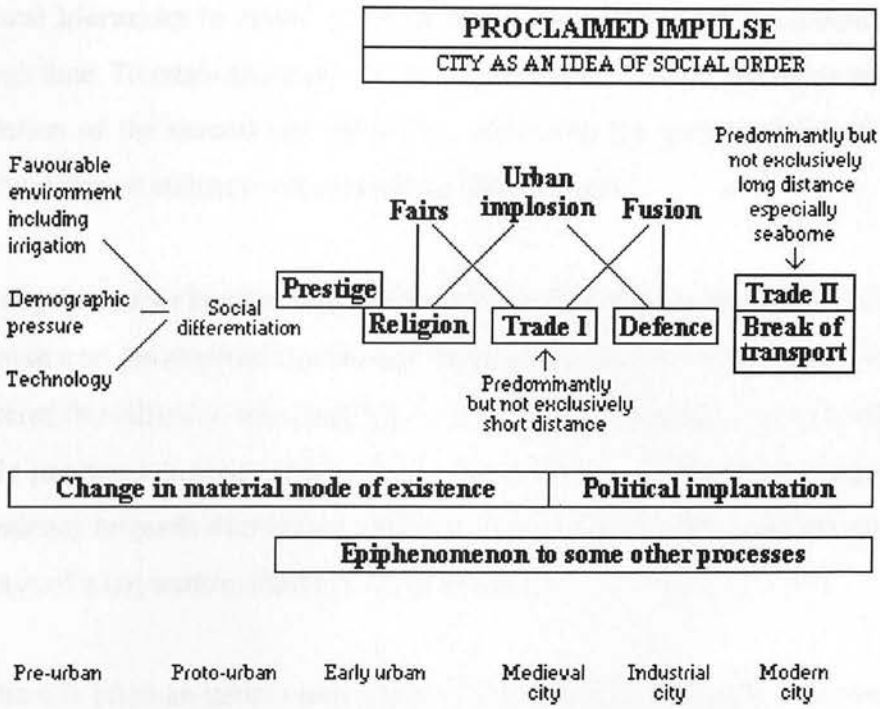


Figure (3.3) General Relationship between some Suggested Causes of City Genesis and Time (Source: Bird, 1977)

3.2.2. Strucutral Hierarchy in City - The Evolution of Centre

The central area of any city has an important **'time'** dimension sometimes jealously preserved and often symbolically flaunted before the visitor. An account containing **'evolution'** in the title is bound to pay careful attention to progression through time. The thread in the last heading was concentration on the **'origin of the first centres'**, and this permitted only the most general forward survey. It was shown that throughout history many different reasons could be invoked for centre or city genesis as soon as there is a dive below the general level of the centre as an a priori idea. To realize how complicated the problem can become one has merely to turn to a brief volume of readings dealing with one country at one period. Benton (1968) attempted a review and paraded eight major theories of town origins which had been

put forward for medieval England. He concluded that it would be a sterile exercise to decide which one was 'right'. Instead each theory ought to be continually subjected to the evidence in an attempt to obtain an acceptable agreement between generality over a large number of cases and congruence with large numbers of individual segments of evidence. This proves to be useful advice if the study of centrality and the city is to be brought closer to the subject of the **'structural hierarchy in cities'** which is more connected to the progression of first centres through time. To retain generality over a large number of cases, the focus will be held on the evolution of the central area of a city; otherwise, the great number of variables contributed by different cultures will overwhelm the discussion.

As the total city increases in size, the centre evolves. There is an important distinction between growth and development on the one hand and evolution on the other. Biologists have encountered this difficulty, and Huxley (1959, p. 27) has remarked that **evolution is an anti-entropic process running counter to the Second Law of Thermodynamics where there is a tendency towards decreasing order**[1] (Medawar, 1967, discusses the problem, p. 43). In the case of a city centre, Bird (1977) has noted:

> "... there is often an initial randomness of functional location which becomes more ordered as the centre grows.... The modern metropolitan system as a whole may tend towards an entropy state of functional location, as suggested by Wilson (1970), with the relaxation time towards this end prolonged by a number of constraints (Gould, 1972, p. 700), many of which are classed under the general heading of inertia" (p. 47).

A suggestion focused by this study is that **while urban systems as a whole obey the Second Law of Thermodynamics** (that they have a tendency to flow from concentration to dispersion proceeding towards increasing entropy) **their centres and later their plurality of centres, diffused outward in innovation leaps from the original centre, manifest an**

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[1] According to the second principle of thermodynamics, the general trend of events in physical nature is towards states of maximum disorder and levelling down of differences, with the so-called heat death of the universe as the final outlook, when all energy is degraded into evenly distributed heat of low temperature, and the world process comes to a stop. In contrast, the living world shows, in embryonic development and in evolution, a transition towards higher order, heterogeneity, and organization (Bertalanffy, 1971. p. 40).

evolution towards organization and negentropy. There results a great mix-up of ordered centres and functionally diverse tributary areas in the biggest city regions, as the citizens become more mobile. In this sense Bird (1977) has noted:

> "Three pathways have been noted for the transmission of innovations through an economic system: (1) **nationally outward from the manufacturing belts**, (2) **down the urban hierarchy**, and (3) **outwards from urban centres into their surrounding urban field** (Berry and Niels, 1969, p. 295).... City centres are important loci of transmission for at least two of these channels" (p. 48).

Hence, as Bird has concluded: "A 'centre' is of itself an open system, dependent not only upon transport links with its tributary area but also having extra territorial links to other organizing centres." It is in the same vein that von Bertalanffy (1968, pp. 144-5) has mentioned **while closed systems obey the Second Law of Thermodynamics and proceed towards increasing entropy, open 'organismic' systems can import negentropy via their extra-system links, and this causes them to tend towards an increasing inner order**.

Here, the study put emphasis on the most important missing point of Bird's argument about urban systems that in searching and analysing the genesis of structural hierarchy as an organizational order for cities, neither the view of the **centre as a closed system** nor the view of the **centre as an open system dependents not only upon transport links with its tributary area but also upon extra territorial links to other organizing centres** (as Bird has concluded) are the important focuses of the subject of centrality. But, instead, the view that the **centre as an open system is part of its living society and not some autonomous by-product of it** (in contrast with earlier proposition that the function of cities is a dependent variable and human motivation an independent variable) becomes the most important focal attribute of it. **This suggests that a 'centre' is of itself an open system: not only linked with its tributary area and even other organizing centres in a systematic hierarchical order of non-living systems such as 'static', 'dynamic' and 'homeostatic' but also most importantly linked with its living society in a systematic hierarchical order of living systems such as 'self-maintaning', 'self-awareness', 'self-consciousness' and 'self-**

ideality'. These values of hierarchical orders which could be found in different levels of system complexes such as self-reproducion', 'teleology', 'meaning' and 'desire' introduce the category of open systems not only limited to the pre-programmed process of living organisms but also most importantly to the open-ended purposeful process of social systems which in our cases, cities and centres, are the main focus of the subject (see Chapter 4).

The aim for this chapter, therefore, is to emphasize on searching the structural hierarchy of an urban system which is known as a living system identified by its social system. In this kind the structural hierarchy would be looking for the genuine structure of the symbols either abstract or concrete which leads a urban system as it alters with lapses of time. It leads all the changes to 'generate' the diachronous sequences of the system over time.

In this kind, therefore, the *structural hierarchy* of a 'static' system or the *laws of mechanics* of a 'dynamic' system or the *feedback and information theory* of a 'homeostatic' system is not the only concern of an urban subject, but also, sometimes the *fixed genetic hierarchy* of a 'self-maintenance' system, sometimes the *fixed knowledge hierarchy* of a 'self-aware' system or sometimes the *open-ended symbolic hierarchy* of a 'self-conscious' or 'self-ideal' system becomes the major focus of an urban question. It depends in which level the study stands for: framework, clockwork and cybernetic in non-living systems or pre-programmed, autonomous and self-reflexive/purposeful in living systems. And, that is why the study suggests the search for functional hierarchy in an urban inquiry which it defines the differences between all these levels and structures (see Chapter 4 Section D on the process of space).

3.3. How Structure Operates; What its Function is?

Throughout most of written history, cities have been the most spectacular embodiment of selective centrality on the surface of the earth; yet, despite modern urban physical obtrusiveness, **the city is the expression of a function rather than a morphological phenomenon**. This is certainly Wheatley's view: "We have argued... that **no specific morphological feature, or even assemblage of features, is an adequate indication of urban status, which can be defined only in terms of function**" (1971, p.394). We can

compare this with the Bird's consistent view on the particular class of cities called seaports: "**Any attempt to define ports by an inherent characteristic of form is impossible. It is much more convenient to define a port in terms of its function rather than in terms of its form**" (Bird, 1957, p.13). Or: "**A seaport is best defined in terms of its function**..." (Bird, 1971, p. 13). **This does not imply that the 'trace on the ground' is neglected, because a centre is not only the expression of a function, an "organizing and regionalizing principle**" in Wheatley's words (1971, p. 477), **but also "a place where the centralising function is proclaimed in vivid three-dimensional form**" (Bird, 1977, p. 42). But, here the question is what do we mean by 'function'? Is it 'function' or hierarchy of function'? And, is it 'hierarchy of the framework of function' or 'hierarchy of function over time'?

3.3.2. Hierarchy of the Framework of Function

Downtown is an American term not much used in Asia or in Europe, yet is useful because vague enough to cover the CBD (central business district), the urban core, and the inner city (where this exists); and, in addition, the word offers a suggestion of relative distance from a periphery towards an urban centre. Perhaps it is wise to start by defining the terms just mentioned, and even wiser to follow the lead of Ter Hart (1967)[2], who took advantage of an Amsterdam study week on the urban core to produce a list of multi-lingual equivalents. Bird (1977) has listed them:

Urban Core: hard core area and core fringe; or inner core area and outer frame (this is more extensive than the CBD) (Rannels, 1956).

Central Business District (CBD):

"Here one finds the greatest concentration of offices and retail stores reflected in the city's highest land values and its tallest buildings" (Murphy and Vance, 1954, p. 189). Gruen (1965, p. 47) feels that the term is misleading in that it

[2] The Hart, H. W., 1967, List of terms used in the study of urban core and inner city, *Urban core and Inner City*, Proceedings of the International Study Week, Amsterdam, 11-17 September 1966. Leiden, Brill, 550-72.

implies that the heart of the city is meant only to serve business. It is perhaps rather the district of centralized business.

Inner City: part of the town formerly enclosed by walls. If this has 'significant architectural qualities' and 'a continuing social life', Papageorgiou (1971, p. 28) would use the term 'historic urban centre'. Other types he recognizes under this heading are: (1) independent and monumental groups of buildings which resemble settlements; (2) small rural historic centres; and (3) medium-sized towns which reached a peak of growth in the past such that the past pattern has not been greatly affected by this century's explosive phases of urban growth (Idem, pp. 32-34).

Downtown: central zone (= vague, perhaps could be defined as the original urban core, based on trade, plus any urban core encroachment over areas originally wholly residential.)

As Bird (1977, p. 68) has indicated the major functions of the urban core are offices, public buildings, and shops; with industries, residences, transportation depots, and warehouses occurring towards the core fringe, perhaps as traces of former patterns. As far as the CBD is concerned, Murphy and Vance (1954) particularly excluded industries (except newspapers), residences, vacant lots, and wholesaling (p. 204). Even public buildings were considered as 'neutral' and included in the CBD only if they met certain contiguity criteria with reference to office and retailing functions (p. 219). Any survey for CBD delimitation will encounter a cross-section of an evolving phenomenon, which Vance (1966, p. 115) called a cell-by-cell replacement by exclusion based on the rent gradient steepening from the centre; and Allpass et al. (1967) even started a paper on urban centre structural change with the headline: 'A C.B.D. Function: A Function Which Has Not Yet Left The Central Business District.' Furthermore Bird (1977) also has mentioned:

> "The functions of the core separate out into a geographical pattern, in clusters or sets, much like the process of crystallisation; in crystallography. There is another term for

the process - centro-symmetric ordering[3]" (p. 68).

This has been a particularly appropriate wording because it includes **both relationship to a centre and the tendency to order through an evolutionary process**. There are many explanatory variables involved in producing centro-symmetric order, and their combined effect is stronger than an entropy-maximizing process: "... **it must be repeated that because centro-symmetric ordering is an evolutionary process, it will tend to be more in evidence as the centre grows in size**" (Ibid.).

3.3.3. Hierarchy of Function over Time

Here, the author would like to mention that the both *hierarchies of framework of function* suggesed above either **'the list of multi-lingual equivalents for functional ordering'** or **'the two geographical patterns of *cluster* and *centro-symmetric* processes'** are examples of observed assemblages. Hillier et al. (1972, p. 66) argue that in the eighteenth century, when the goal of science was, in general, the taxonomic ordering of observable differences and similarities, 'structure' was defined in terms of observable assemblages: ".... By the structure of a plant's parts we mean the composition and arrangement of the pieces that make up its body" (Ibid.). The discovery that **the inner architecture of form** was not given in its **surface appearance**, and that its **explanation** required concepts of **'function'** and **'transformational time'** is, more or less, the difference between eighteenth century and modern science. The theory of evolution, as Hillier et al. (1972) have explained:

1) "discovers the source both of stability and change in the historical development of the system in question;
2) shows how a self-regulating system [or a self-maintenance system - author's emphasis] can create its own regulators, which are themselves continuously changing with the system;
3) it is an interactionist theory in that it shows how the 'environment' and the 'organism'

[3] "The analogy from crystallography is suggestive rather than exact. Symmetric ordering of functions in cities around a centre is a tendency towards an ultimate state that never arrives; but then the idea of crystal as a regular repetitive array of atoms is also an idealisation in some respect" (Bird, 1977, p. 68).

are bound together in the process of development and are mutually constructive;

4) it may be seen as a form of hypothetico-deductive system, in which random mutations are proposed as hypotheses to the system as it has then evolved and these are then evaluated by the environment. In other words the machine can learn and change its rules as well as reproduce itself and keep itself in a relatively ordered and stable state;

5) it combines the ideas of change and stability with all its imperfections, and its residues of organism-environment thinking" (p. 64).

Therefore, it is definable that in no sense can be systemness of any natural, social or environmental whole be said to arise only from **the interaction of units within that system**: "Systemness arises from **the transformational history of the system and its units, regulated by the system itself as it evolves**.... Any system must be explained in terms of its history as it transmitted through **the structure of its units**, and regulated by **the evolving systemic regulators**" (Ibid.). In other words, it is concluded that in no sense **changes** are **secondary** and **arising from the 'interaction of units'**, but they are **elementary** and **organising the 'relations between units'**.

In fact the theory of evolution has concerned itself largely with the missing component of the internal account of the transmission of stability and the generation of variety. Or, in other words it is looking for the **emergence of these organizing relations in the first place** (see Chapter 1). According to Waddington (1969), two important innovation have reduced the **'randomness'** factor in mutation. The first is the notion of **combination** and **recombination** of existing genotypes which has arisen from improvements in genetics. The second is the **complexity of the processes** by which the genotypes develops into the phenotype. And the overall lesson of this work is cleared by Hillier et al. (1972) that:

> **"The theory of stability of any system in nature or the artificial, including the ability to generate change, must be in space-time, not in three dimensional synchronous space. A situation of structural stabilityof any particular point in time** [as observable asemblages - author's emphasis] **may be understood, but it will not be explicable on the basis of the synchronous interaction of 'elements'"**(p.65).

The meta-theoretical perspective that is required is well illustrated by Smith (1968): "It is neither possible nor necessary to study all the structures that might have existed, but there is a need for studying more than a statistically averaged structure [as observable asemblages - author's emphasis]. Is there not possibly an intermediate science using structure that exists - important for no other reason than that it does exist - both as a key to history and as a framework for continuing process?" **Smith sees all complex structure both as a record and a framework**: "... **The advancing interface leaves a pattern of structural perfection or imperfection which is both a record of historical events and a framework within future ones must occur**" (p. 637).

In effect the time that is introduced is not simply **chronological time**: it is **the irreversible time of transformation**. Hence, instead of the **system question** 'How can these observable be related in **a statistical model**?' **structure answers** the question 'What machine could generate **this variety of observable**?' This generates the contrast between the structure and system concepts as Hillier et al. (1972) explain: "**Systemness is a property which is over and above a totality of lower-order entities and relations** [the secondary manifest relations of entities to create the totality - authors emphasis]. **Structure, on the other hand, is far less than a totality, being an abstract set of formal relations underlying the greater manifest richness of observable forms**" [the elementary organizer of relations between entities to build up the totality - author's emphasis] (pp. 66-67).

Hence, the explanatory strategies which result from the transformational approach over time may be compared to those prevalent in the environmental sciences generally: "**In structural sciences strategies that are concerned to generate synchronous variety may be distinguished conceptually from those concerned to generate diachronous sequences**" (Ibid., p. 72). These correspond to the two principal explanatory strategies in *environmental studies* generally and to *the concept of centrality in urban studies* particurally where, in **the synchronic plane, the aim is usually to produce 'typologies' by statistical analysis of distributions of variables** (in 'urban centralities' such typologies of form, function and hierarchy; in 'urban centres' such typologies as urban core, CBD, inner city and downtown; and in 'geographical patterns of evolution processes in urban centres' such typologies as

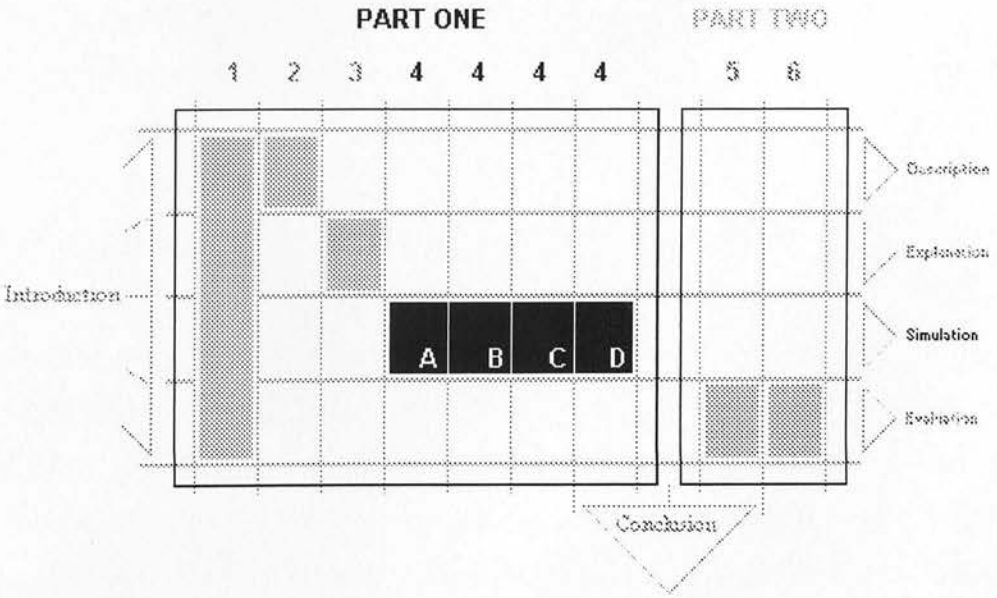
cluster and centro-symmetric processes; etc.), and in **the diachronous plane**, **to identify 'causal' relations usually by experiment or retrospective multivariate analysis in terms of time sequences**. As Hillier et al. (1972) stress: "In environmental studies the synchronous dimension is associated with 'description' and the diachronous dimension with 'theory'. The transformation approach [or structural approach] rewrites both strategies at a fundamental level, locating both at the level of theory, and using the notion of 'generation' in order to show connections between different observable forms (whereas the members of a typology are theoretically unrelated) and to explain connections in terms of time sequences" (p. 72).

In Chomsky's terminology, for instance, what is seen or heard is a 'surface structure' [or structural hierarchy - author's emphesis], which is a 'transformation' on a 'deep structure' [or functional hierarchy - author's emphasis]. In fact, Chomsky's 'deep structure' is fully equivalent to the normal meaning of the term 'structure'. Therefore, in the case of the centrality in the structure of 'urban systems' it is not only in the plane of the 'surface structure' (i.e. *'the hierarchy of the framework of function'* or *'the functional hierarchy of urban systems in synchronous plane'*) that the 'hierarchy of function' should be inquired. But, instead, it is also in the plane of the 'deep structure' or 'transformational rules' (i.e. *'the hierarchy of function over time'* or *'the functional hierarchy of urban systems in diachronous sequences'*) that the 'hierarchy of function' should be questioned (see Chapter 4 on centrality *and* the structure of process in living complex urban systems).

4

CHAPTER FOUR

CENTRALITY *and* THE STRUCTURE OF PROCESS IN LIVING COMPLEX URBAN SYSTEMS



4

CENTRALITY *and* THE STRUCTURE OF PROCESS IN LIVING COMPLEX URBAN SYSTEMS

SIMULATIVE MODEL:
Function-Modelling the Structure of a Complex Urban System

Introduction to Chapter 4

Introduction to Chapter 4

In this chapter the main question arises that how we can find the actual hierarchy of function of an urban system over time. For explaining the structure of an urban system we may find statistically the *hierarchy of the framework of function* by typologies and categories of shops and buildings in synchronous plane (as defined by Bird), but we can never see and treat them as the hierar*chy of function* in diachronous sequences. We need to move on *functional hierarchy as the source of the generation of synchronous planes* over time. What does it mean therefore in relation to *centrality in the structure of complexity of an urban system*?

In a sense, the study is looking for the structure of a process in which the system alters with the lapse of time, a living process. The focus is to *simulate* how the process of a complex urban system operates as time passes and how it relates to the concept of centrality. It is therefore the major concern of this chapter that there are different categories of living processes: (1) the category in which there are different kinds of living processes from *pre-programmed/fixed genetic* one to *social open-ended/purposeful* one; and (2) the category in which there are also two kinds processes: the *concrete* and the *abstract*. The concern is to focus that in all cases related to the first category there is always a need for being practised in a concrete system, or in other words a need for being manifested in a three dimension synchronous space. This defines the notion of space as much as possible integrated to the notion of practice or function. In fact, here the term 'space-time dimension' is fully equivalent to the normal meaning of the term 'diachronous sequences'. So, the functional hierarchy of Man's thought, as an open-ended ideal seeking process operating across space and time, is the focus of this chapter.

Since the task of this study is to formulate the concept of centrality by comparing 'descriptive', 'explanatory' and 'simulative' approaches, this chapter mostly tends to *simulate* the process of the structure of complexity of urban systems to *explain* what their *function-modelling* really are. It is, in fact, in contrast either with *describing* or *individuating* the structure of the complexity of urban forms to imagine what their shapes really are or with *explaining* or *understanding* them to determine what could have produced them. It deals neither with *surface appearance of urban forms* nor with *surface appearance of urban systems* - structural

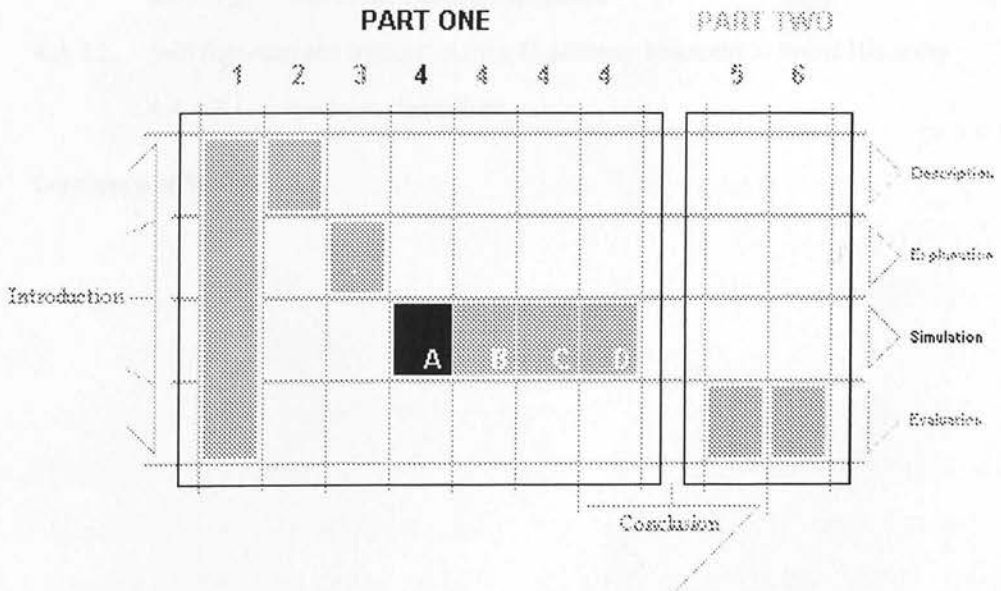
hierarchy, but with the *mechanism* within which the *deep symbolic structure* of urban forms or urban systems is appeared - functional hierarchy. It, therefore, looks to the *simulate* approach of the differences between different levels of functions within which the appearance of complexity of urban forms is emerged: the 'function-modelling' of analysis, which place the concept of centrality in the nature of the structure of process in living complex urban systems.

The chapter so starts with a direct look to the nature of complexity of *living organism processes* to see how the order of organization emerges from the centre itself (see Chapter 4 Section A on living organism processes). Then, it continues to find out how we describe *purposeful ideal-seeking processes* to highlight the genesis of their symbolic orders. It is in fact compares social systems with other living systems to find out their organizational centre (see Chapter 4 Section B on purposeful ideal-seeking processes). It goes then to determine how we characterise the creative power of *the process of thought* that an evolutionary thought as a centre itself contains all the symbolic orders in its centric nature (see Chapter 4 Section C on the process of thought). And at the end, the chapter defines how the process of producing built environment is also affected by its centre. By identifying *the process of space* it concludes that an ordered spatial milieu is a constructed spatial structure which produces and reproduces not only actual social relations but also the principles for ordering social relations. It defines that the best key to the spatial structure of environment might be the generative rules underlying the material form rather simply the form itself (see Chapter 4 Section D on the process of space).

4.A

CHAPTER FOUR

ON LIVING ORGANISM PROCESSES



4.A
ON LIVING ORGANISM PROCESSES

Introdction to Section 4.A

4.A.1. Potential Generative Capacity and the Realization of that Potential

4.A.1.1. Setting Hypothesis and Testing Hypothesis
4.A.1.2. Genetic Information and Programmed Instructions

4.A.2. Hierarchical Interfaces

4.A.2.1. Hierarchical Organization
4.A.2.2. Structural Hierarchy and Functional Hierarchy
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4.A.3. Parts and Whole

4.A.3.1. Wholeness, Sum, and Mechanization
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4.A.4. Fixed Rules and Flexible Strategies from Plant to Man

4.A.4.1. Interlocking Hierarchies and Feedback Control

4.A.4.1.1. Self-Regulative Hierarchies
4.A.4.1.2. Self-Awareness Hierarchies
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4.A.4.2. Self-Assertion and Integration from Organismic Hierarchy to Social Hierarchy

4.A.4.2.1. Symbolic Hierarchies

Conclusion of Section 4.A

Introduction to Section 4.A

In approaching the longstanding structure-function question contemporary atomists ascribe the emergence of order to some principle of interaction between the parts of which the entity is made. This is a perfectly consistent and sufficient idea as far as it goes. But this hardly seems a promising approach to the **complex organization of living systems**, let alone their creative behaviour. **The fact that all living systems exchange material with their environment and yet retain a form of organization that remains stable, has been offered as a new route into the basic problems of alive systems**. In this relation Longuet Higgins (1971) says:

> "The processes of life are directed by programme, in the most professional sense of that word. In nature the really distinctive thing about living processes is that they exhibit programmed activity, while non-living processes do not. Many physical processes produce complicated ordered patterns such as snowflakes or convection. Feeding, replication, excretion, homeostasis, all these properties are exhibited by fire. It consumes fuel, it multiplies, it produces hard ashes, it is hard to blow out. But it is not programmed" (p. 373).

Since we are dealing with living processes, the chapter starts with an analytic journey to biological characteristic of living processes to see how the order of organization emerges from the centre itself. Then, it looks at social processes, and compares them with other living processes, to find out their organizational centre. And finally, at the end it sees how the process of producing built environment is also affected by its centre.

But 'why biological processes' is the question which leads the author to talk very briefly about the principle of organization in the history of scientific approach? In a sense, if the dominant metaphor for the scientific universe of the eighteenth century was the *clock*, that of the nineteenth century was the *steam engine*, the **'thermodynamic'** machine. The steam engine is as much a machine as a clock, but it is a different type of machine. As Hillier et al. (1972) explain: "Clocks are theoretically similar whether run forwards or backwards, but steam engines run on **'irreversible processes', and thermodynamics is a science of irreversible**

physical processes" (p. 41).

The application of the thermodynamic model to the study of **'organisms'** generated as a central theoretical question how the organisms, subject to a continuous programme of input, process, output, leading to its **progressive replacement**, nevertheless retains its internal **coherence**, **unity** and **identity**. What is it that stays the same when everything appears to change; or in its modern form **what is the invariance under transformation of a particular set of phenomena**?

In nineteenth-century physiology: (1) characterising the states of a particular type of machine especially those states that have to do with its **'stability'** and the mechanics by which they are realised; (2) the term **'homeostasis'** by Walter Cannon in 1932 only many decades later to characterise such stable states in machines which continuously import and export to and from their environment; (3) the characteristic notion of a **'system'** as a set of *'elements'* and *'relationships'* by Bertalanffy in 1968, and also McLoughlin and Webster in 1970; and finally a **'field'** which is not an aggregation of elements, but an expression describing a set of relations between things governed by some overriding formative law by Cassirer in 1953, are examples of some efforts in this subject (Hillier et al., 1972).

Hillier et al. (1972) state that the notion of the 'field' is the foundation of **'gestalt psychology'**, the **first science of organization** in the human sphere: "Gestalt psychology made the first inroads into the centuries old psychological paradigm which required the building-up of higher order behaviour by aggregating lower order behaviours, whether by the laws of association or whatever. The gestalt psychologists were able to show that in important ways perception was indeed not additive, figures not the sum of their parts" (p. 44). But **'system theory'**, as they continue, in the sense in which it is now normally used: "originated in an attempt to utilise these lines of thought, principally the thermodynamic analogy and the gestalt concept, in constructing a scientific alternative to the biological theories of *'mechanism'* and *'vitalism'*, between which a conflict existed in the 1920s. Mechanism constructed the organism *'from the outside'*, whereas vitalism sought some extra principle, probably inaccessible to science, at the *'centre of life'*. System theory, sought to replace both concepts by theories based on the

form of **'organisation of living organisms'"** (p. 45).

None the less von Bertalanffy's series of texts represent the early line of thought in biology which sought to find the key to living processes not only in **'systemness'**, but also in a certain property of living systems, that of **'openness'**: "**The fact that all living systems exchange material with their environment and yet retain a form of organization that remains stable was offered as a new route into the basic problems of biology**" (Ibid., p. 45).

On the other hand **'cybernetics'** was conceived in the same general nexus of ideas as system theory, but its perspective was different from the outset. At the simplest level cybernetics is concerned with the **mechanics** of systems or minimally with certain aspects of the mechanics, and this leads it to a central preoccupation with the concept of **information** (Ibid., p. 46). It grew up in close relationship with the mathematical theory of communication which its essence is given by this term: "**the key to 'control' is in 'communication'**" (Shanon and Weaver, 1969). Cybernetics was thought by Wiener in his foundation book of 1948 to be as true of machines as it was of organisms and also of relatively finite and bounded sociotechnical systems and productive process like factories.

The difference between general system theory and cybernetics is well given in following quotation form von Bertalanffy (1968), which also characterises the limitation of each:

> "The basic of the open system model is the **dynamic interaction of its components**. The basic of cybernetics is the feedback cycle, in which, by way of **feedback information**, a desired value is maintained, a target reached, etc. The theory of open systems is generalised kinetics and thermodynamics. Cybernetics is based on feedback and information.... **The open system model in kinetic and thermodynamic formulations does not talk about information. On the other hand, a feedback system is closed thermodynamically and kinetically; it has not metabolism**" (p. 157-8). [author's emphasis]

4.A.1. Potential Generative Capacity and Realization of that Potential

The question nowadays is what answer do we have on the nature of the formative influences which are responsible for the generation of characteristic structure and behaviour in organisms. What answer do we have to the problem of the **emergence of order**, particularly that of creative, novel, order?

One of the conflicts between Aristotle and Hippocrates, an atomist, was on this area. As Brian Godwin (1972) explains, Hippocrates insisted that the general similarity of static and dynamic form between parents and offspring was due to the **transmission of specific substances** from parental organs to the embryo. Hippocrates's position was clear: specific structure is transmitted by specific substances. The modern version of this theory is equally clear and unambiguous: the resemblance between parents and offspring arises in consequence of the **transmission of specific genes** from one generation to the next. It appears so self-evident to the modern scientific mind that the difficulties of this position are often not even considered; or else these difficulties are dismissed by means of the additional principle that all one needs to add to it is **the concept of interaction between the units**, **the gens**, to complete the picture.

Aristotle's objections to the atomist position are both simple and convincing. How, he asked, could a young man without a beard transmit to a son the substance required to grow a beard if that substance had to come from the beard itself? Or how could a man who had lost his hands in battle, say, nevertheless transmit the capacity to form hands in his offspring? Goodwin (1972) explains:

> "The problem here is that between **'potential generative capacity'** and the **'realization of that potential'**. What substance can carry such potential? Aristotle contended that from substance alone one cannot make deductions about form; that knowing the composition of something is not sufficient to determine its structure.... One must add to substance a **principle of organization**, which for Aristotle was a **'form'** or an **'idea'**, immanent in the process whereby order of a characteristic type emerges from disorder or lower order, as the embryo from the egg" (p. 370). [author's

emphasis]

The author would also like to try to describe what seems to Waddington (1969) the essentials of the genetic process? He starts by defining a genetic system. "A genetic system involves the transmission from one generation to the next of something or another." He calls it **'information'** although he quickly points out that this is not a very good name. This information has to be carried by some **'material structure'**. So let us start, he says, with some material structure P which has some characteristic Q which we are referring to as information. Now a genetic transmission of this takes place if, when you put into certain conditions, it produces more of Q. This is a very general definition of the **basic logical structure of genetic transmission**; it can apply to things which are clearly not biological; for instance he says; if we have a crystal which has a dislocation on one of its faces at which the atomic arrays are slightly displaced, then the next layer which forms on this crystal as it grows will usually have the same dislocation. This is an example of the **transmission of the dislocation**. Moreover the dislocation may be transmitted even if the next layer of material precipitated on to the crystal is different from the earlier material. There can therefore be a genetic transmission into a range of different materials, and the transmission can take place in a variety of different conditions, for instance, of temperature or concentrations of various substances in the solution. There could therefore be a sort of natural selection, in which those types of dislocation which were most able to transmit their characteristics under a wider range of conditions would be favoured.

This example shows that we could find processes with the logical characteristics of genetic transmission, and even of natural selection, in systems which nobody would be tempted to call living. That is why it is inadequate to try to define life that its essential characteristics are genetic transmission and natural selection. But one might ask, why do we deny the title of living to such a system as a crystal which transmits its various dislocations to the next layers of molecules that settle on its surface? Waddington (1969) answers that:

> "This sort of **'information'** is **'purely genotypic'**. **'It is simply transmitted'**, and **'itself does nothing to its surrounding'** so as to produce from them anything that

> can be regarded as a **'phenotype'**. **The purely genetically transmissible aspects are simply not interesting enough to be called living**.... In order to have an evolving system comparable to the biological ones it has to include not only **genetic transmissible information**, but **this information has to do something to its surroundings**.... We need **'transmissible instructions'**, or **'programmes'**" (p. 362). [author's emphasis]

Higgins (1970) argues if the idea of a programme has any meaning at all, it must be possible to distinguish **'different programmes'** from one another; to say that there is just one programme for every thing is to make nonsense of the world. Or another distinctive feature of a programme is its **'conditional character'**. All programmes of any interest contain instructions of the type 'if (dot, dot, dot) then do such and such, otherwise do something else'. The 'something else' may be to enter a particular subroutine, or to move to a different point in the programme, either an earlier point or a later one. The extraordinary thing is that one can now point to an actual programme tape in the heart of the cell, namely the DNA molecule. Computing scientists agree that the idea which made their whole subject possible was that of the 'stored programme'.

Is Higgins suggesting, then, that life is just programmed activity, in the computer scientist's sense of 'programme'? Will he find himself driven into saying that a computer is alive, at least when it is executing a programme? But he would not put it past computing scientists to construct a machine which would have to treat as if it were alive. He thinks that the **'programmed activity'** which we find in nature is marked by at least one characteristic which hasn't yet been successfully copied by the engineers. As He says:

> "In nature **the controlling programmes do not merely determine the way in which an organism reacts to its environment**. **They also control the actual construction of the organism, and its replication, including the replication of the programmes themselves**.... So life is not merely **'programmed activity'** but **'self-programmed activity'**." [author's emphasis]

Waddington (1969) describes that at the core of the living system is DNA, a substance which is sufficiently inert and unreactive to serve as a reliable memory store. By itself it can do almost nothing; it is very inefficient at producing a copy of itself which could be transmitted to the next generation. However, it occurs in association with protein enzymes, which in the first place enable it to be replicated, so that there are copies to pass on to the daughter cells, and which also use the information stored in the DNA to produce a corresponding RNA and that in turn is used to guide the synthesis of a corresponding protein. As he says:

> "This whole system works extremely efficiently, but as you see it involves separating **the function of reliability in storing information** from that of actually **using the information as instructions to change the surroundings**. It is, I suppose theoretically possible to imagine a substance which was both inactive enough to be reliable and active enough to have effects in producing a phenotype.... It is stuck with a system in which there is an inescapable difference between the **'genotype'** - what is transmitted, the DNA - and the **'phenotype'** - what is produced when the genotype is used as instructions" (p. 363). [author's emphasis]
>
> Or Goodwin (1972):
>
> "This genetic information is in **'symbolic'** form; i.e. it cannot interact directly with the external 'world' of nutrients, salts, oxygen, etc., which define the environment of the bacterium. It has to be translated into another language, generally that of proteins, before interaction and testing can occur. A bacterium carrying the genetic information for the metabolic utilization of the sugar lactose may be said to carry the **'hypothesis'** that lactose is likely to be encountered in its world, and that this substance can be transformed in a particular way to provide energy and building blocks for growth" (pp. 371-2). [author's emphasis]

Goodwin (1972) argues suppose we regard living organisms as systems which **generate and test hypotheses about their environment**: "At the psychological level this has fairly direct intuitive meaning. But what would it mean about a bacterium? It would mean that such a

system has a set of hypotheses which are present in coded, symbolic form in order to satisfy our intuition about the nature of hypotheses; that these must be subject to variation and test in relation to an external world; and that there must be some principle of correspondence whereby **'good'** hypotheses about this world can be retained and stored while **'bad'** ones are discarded."

In this relation Waddington (1969) describs that the genotypes of higher organisms contain enormous numbers of genes. There are a few tens of thousands even in a bacterium, and at least some hundreds of thousands, possibly up to a million, in such highly evolved organisms as ourselves. Now if we consider each gene as an instruction, and think of the number of ways these instructions can be combined with one another and interact with the surroundings, the possible number of combinations is truly astronomical. He says:

> "In these terms we can imagine a multidimensional space with one dimension for each type of gene, so that a particular genotype can be represented as a single point within it. Now from any particular genotype there eventually develops a corresponding phenotype, which again we could locate as a point within a multidimensional phenotype space. However, between the genotype space and the phenotype space we must remember that there is a whole series of processes in which the various genetic instruction interact with one another and interact also with the conditions of the environment in which the organism is developing" (p. 362). (see Figure 4.1)

The system therefore moves from the genetic space into the phenotype space through what Waddington calls it an 'epigenetic space', i.e. a space of developmental processes, which he has represented by vectors which are tending to push the developing processes in one direction or another. Now, not all these arrows or 'epigenetic operators' as he calls them, arise from the instructions in the genotype; some of them originate from the 'environment'. As he continuous:

> "The genotype can produce a number of phenotypes according to what the environment of the developing system has been. This means that if you start with a

phenotype, as natural selection does, there is an essential indeterminacy in the relation between that phenotype and the genotype; the relation only becomes if you take into account the environment also.... In fact in evolution the indeterminacy is even worse than this, because natural selection does not pay attention to all the characters of the phenotype, but only to its fitness.... So to get back from there to the genotypes you have first to go from the one-dimensional fitness to a many dimensional phenotype space and then from the phenotype space through the epigenetic space with its environmental components, to the genotype space" (Ibid.).

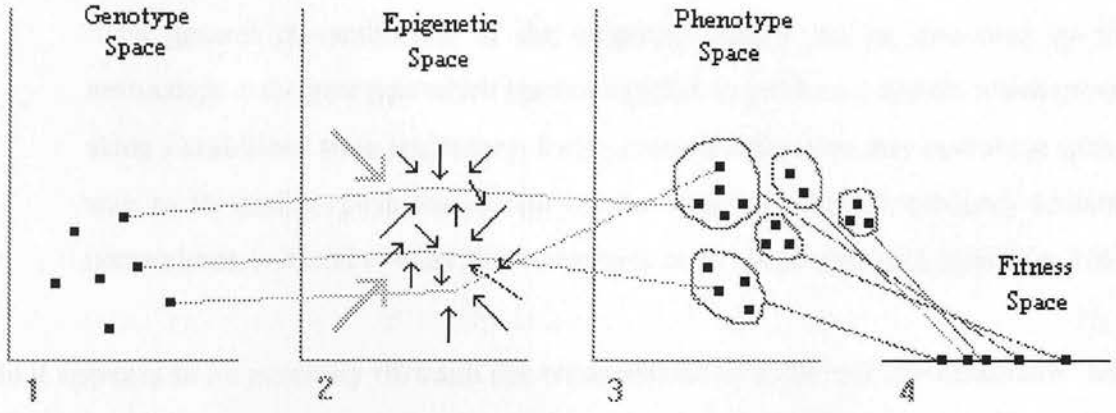

Figure (4.1) From the Genotype Space into the Phenotype Space (Source: Waddington, 1969, p. 364)

So the environment in which organisms live, develop, and are selected, are neither wholly dependent nor wholly independent of the genotype of the organisms involved. To some extent an organism's phenotype (particularly in its more elaborate development, the behaviour of an animal), can influence the type of environment in which the organism lives; many organisms if they do not like the situation where they are, have the ability to move away and try somewhere else. On the other hand there are aspects of the environment which the organism cannot influence; there may be a new ice-age round the corner, or a new predator or a new disease may suddenly appear.

But the point which Waddington is going to emphasize is that such systems usually exhibit a kind of stability. He has used the words canalization or **'homeorhesis'** to describe this. The latter is a new word. It is related to the well-known expression homeostasis, which is used in

connection with "**systems which keep some variable at a stable value as time passes**" (p. 366). A thermostat, for instance, is a device for producing homeostasis of temperature; or in the biological world it is well known that there is a homeostasis of the level of carbon dioxide in the blood, which is adjusted by varying the rate of breathing, for instance, so that the concentration of dissolved gas remains constant. Waddington uses the word homeorhesis when "**what is stabilized is not a constant value but is a particular course of change in time**" (Ibid.). If something happens to alter a homeorhetic system the control mechanisms do not bring it back to where it was at the time the alteration occurred, but bring it back to where it would normally have got to at some later time[1]. As he writes:

> "The general characteristics of the epigenetic space can be described by the instructions in the genotype which interact together to produce a system which moves along a **stabilized time trajectory**. Environmental influences may operate in such a way as to tend to push the system off the trajectory, but its tendency towards homeorhesis, will tend to bring the system back on to the normal path again" (p. 366).

So it appears to be precisely through the transmission of such 'non-deterministic' but 'unfoldable' symbolic structures that living organisms retain their stable forms yet participate in a gradual evolution.

4.A.1.1. Setting Hypothesis and Testing Hypothesis

Now, a question remains that what possible value is there in regarding organisms as hypothesis generating and testing system? There are three consequences which occur to Goodwin (1972) immediately. The first is a suggested resolution of the atomist-idealist conflict. Hippocrates and the atomists were correct to maintain that there are distinct substances which are transmitted from generation to generation and that the composition of the system is a very important aspect of its structure. And Aristotle was correct to insist that

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[1] The 'rhesis' part of the word is derived from the Greek word Rheo, to flow, and one can think of a homeorhetic system as rather like a stream running down the bottom of a valley, if a landslide occurs and pushes the stream off the valley bottom, it does not come back to the stream bed at the place where the diversion occurred, but some way farther down the slope (Waddington, 1969).

something like formative 'ideas', different in some sense from ordinary physical matter, must guide the intricate and extraordinarily varied formative processes of organic nature. As he says:

> "We now recognize this difference to lie in **the symbolic nature of the genetic code** and **the remarkably elaborate system cells have for its translation**. It is genetic symbolism that enables living matter to step outside of the constraints imposed by physical laws formulated in terms of minimal potential criteria.... **The symbolic nature of the genetic material is what provides a virtually inexhaustible reservoir of potential genetic states for evolution**, since symbols can be juxtaposed in very many different ways to provide new 'statements', new hypotheses, which can then be tested" (p. 372). [author's emphasis]

For Goodwin the second obvious result of looking at organisms in this way is that **the hereditary material speaks to a competent hearer**, and assumes that it can interpret and test the hypothesis it is presenting in some manner that will establish whether or not they have meaning. As he states:

> "Considering the hereditary material as a set of hypotheses immediately puts the genes in their proper place. **For it is evident that a hypothesis is always considerably less than a total set of instructions for its interpretation and test, without which the hypothesis is useless**. The gene in the lactose operon which codes for the particular enzyme known as the lactose permease is taking for granted a great deal about the pre-existent structure and activity of the cell. If there were no cell surface, for example, no membrane, the genetic 'statement' would be meaningless, uninterpretable[2]" (Ibid., p. 373).

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[2] In like manner, if a person says that he holds the hypothesis that there is life on Mars, then he is assuming a very great deal of knowledge on the part of the person to whom he is speaking. Quite apart from the basic assumption that the hearer is competent to interpret the sentence grammatically, extensive experience of the world is also taken for granted: that there is an actual entity located in a defined position known as Mars, that the hypothesis has some meaning, e.g. that there is some possible relationship between life and Mars; that there are ways of testing this meaning, etc.

This context provides a natural and immediate framework for comparison of different levels of organization of the biological process. It is intuitively evident that, at the level of mind, hypotheses are subject to continuous alterations as a result of experience, a testing of their relevance and meaning. Goodwin also continuous:

> **"In contrast, within the lifespan of any single organism, genetic hypotheses cannot, according to current theory, be so altered or improved. An organism inherits a fixed set of hypotheses and its life may be viewed as an unfolding of strategies consistent with these constraints. The genetic hypotheses are subject to alteration from generation to generation, of course, by a process which neo-Darwinism theory ascribes to random mutation. But such alterations are not considered to be directed in any way, in contrast to mental hypotheses which are subject to criteria of improvement. Behaviour involving the cognitive processes can in fact be viewed as the continuous formulation, testing, and improvement of hypotheses according to criteria of behavioural success, whatever these may be"** (pp. 373-4). (see Chapter 4 on purposeful ideal-seeking processes)

4.A.1.2. Genetic Information and Programmed Instructions

As reviewed, therefore, the basic problem in living systems is the relation between structure and function, between the **'potential generative capacity'** and the **'realization of that potential'**. That from substance (structure) alone one cannot make deductions about form (function). One must add to substance a **'principle of organization'**, a 'form' or an 'idea', immanent in the process whereby order of a characteristic type emerges from disorder. Biologists recognize this difference to lie in **the symbolic nature of the genetic code** and **the remarkably elaborate system cells have for its translation**. It means that system involves separating the function of storing information from that of actually using the information as instructions. So not only we need **'transmissible information'** but also **'transmissible instructions'**, or **'programmes'**.

But, in nature the controlling programmes do not merely determine the way in which a living system reacts to its environment. They also control the actual construction of the system,

including the replication of the programmes themselves. Hence, life is not merely programmed activity but **'self-programmed activity'**. It would mean that such a system has a set of hypotheses which are present in coded; that these must be subject to variation and test in relation to an external world; and that there must be some principle of correspondence whereby 'good' hypotheses about this world can be retained and stored while 'bad' ones are discarded.

But, what possible value is there in regarding organisms as hypothesis generating and testing system? There are three consequences: First, the symbolic nature of the genetic material is what provides a virtually **infinite reservoir of potential genetic states** for evolution. Second, considering **the hereditary material as a set of hypotheses immediately puts the genes in their proper place**. It speaks to competent hearers, and assumes that they can interpret and test the hypothesis. And finally this context provides an immediate framework for **comparison of different levels of organization** that, **at the level of mind, hypotheses are subject to continuous alterations as a result of experience**. It is therefore concluded that there are two approaches: 'information' and 'instruction' (see Figure 4.2).

Information	**Instruction**
'Potential Generative Capacity'	'Realization of that Potential'
'Substance'	'Form' 'Idea'
'Purely Symbolic and Genotypic'	'Elaborately Systematic and Dynamic'
'Reliability in Storing Information' , 'Elements'	'Reliability in Using Information' , 'Relations'
'Transmissible Information'	'Transmissible Programmes'
'Setting Hypothesis about Environment'	'Testing Hypothesis about Environment'
'Deterministic'	'Non-Deterministic' , 'Conditional Character'
'Symbolic' , 'Possibility of Different Statements'	'Stable' , 'Homeorhesis against Environmental Influences'
'Itself Does Nothing to its Surroundings'	'Active in Changing its Surroundings'
'Stepping Outside of Constraints Imposed by Physical Laws'	'Putting Genes in Proper Place' , 'Speaking to Competent Hearers'

Figure (4.2) The Comparison between 'Information' and 'Instruction' Approaches (Source: The Author)

4.A.2. Hierarchical Interfaces

Pattee (1970) explains it is the central problem of the origin of life, when aggregations of matter obeying only elementary physical laws **first began to constrain individual molecules to a functional, collective behaviour**. It is the central problem of development where **collections of cells control the growth or genetic expression of individual cells**. And also it is the central problem of biological evolution in which **groups of cells form larger and larger organizations by generating hierarchical constrains on subgroups**. And **the central problem of the brain where there appears to be an unlimited possibility for new hierarchical organization**. He states:

> ".... Life is distinguished from inanimate matter by exceptional **dynamical constraints or controls** which have no clear physical explanation (i.e. no currently conceivable 'direct interaction' interpretation). We will not find such an explanation by inventing new words for our descriptions of each level of **'hierarchical control'**. **Instead we will have to learn how collections of matter produces their own internal descriptions**." [author's emphasis]

Pattee furthermore explains that living matter is distinguished from non-living matter in the final analysis, not because of its molecular structures, but because it evolves quite differently from non-living matter. Living matter exists only because it evolves in **'time'** in a course which laws of motion have not yet suggested. Many biologists had realized long ago, that **the more we learn about the detailed relations of biological structure to its 'function', the more difficult becomes the problem of how these relations between structure and function arose**. As he says:

> "Function is never determined by a particular structure itself, but only by the context of the organization and the environment in which this structure is embedded. Nor is structure determined by function alone, since many different structures can perform the same function" (p. 119).

In approaching this long-standing structure-function question, Pattee thinks, it is becoming

clear that we get nowhere by separating the reduction-type question, *how does it work*, from the origin-type question, *how did it arise*. These are really two ways of viewing the same basic problem. He calls this the problem of the description of **'hierarchical interfaces'**: "A hierarchy in common language is an organization of individuals with levels of authority - usually with each level subordinates to the next higher level and ruling over the next lower level. However, **neither the authority nor the subordination between levels is complete**. **Each level has its own laws or rules which control the behaviour within each level. The effort of the subordination of the lower level to the hierarchal rule is to constrain or integrate the activities of the individuals so that they function coherently**" (p. 119).

> "**This is a valid critisim for narrow theories which try to guess how things work at one level**, since that question is answered on any one level by simply looking in more and more detail at what is actually happening. Within the bounds of each level, languages grow in precision and formality; but paradoxically, they tend to become incompatible with the languages at neighbouring levels. In all cases, we manage to gain formal precision at the higher level of description only by sacrificing some of the details of the motions at the lower levels. **The root of this problem is clearly not in the 'detailed facts of one level' or another, but in the 'relations between levels'**" (Ibid., p. 120). [author's emphasis]

Therefore in order to better understand the origin and nature of hierarchical organization Pattee does not direct his attention to the detailed of each level, but rather to the division between levels which he calls the hierarchical interface. Therefore, in order to see the central problem of hierarchical organization more clearly, it is helpful to look at the difficulties which arise when the hierarchic interface is viewed from only one side or the other. Viewed from the **'lower side'** of this interface, the elementary laws are regarded as the given conditions and the problem to see how the hierarchical constrains arise to perform integrated function at the higher level. Viewed from the **'upper side'** of this interface, the hierarchical constrains are regarded as the given conditions and the problem is to see if the integrated function is consistent with the elementary laws.

Two examples of these views, as Pattee quotes, may be found in writings of Francis Crick and Michael Polanyi. Crick in his book *Of Molecules and Men* defends complete reductionism in biology because, by assuming all the hierarchical structure of cells as given, he feels that all the resulting elementary motions can be explained in terms of ordinary physics and chemistry. At the other extreme is a paper by Polanyi on *Life's Irreducible Structure*, in which he assumes that all the molecules obey physical laws but claims that the origin of the constraints or boundary conditions which result in hierarchical integration are irreducible to those laws. There are of course, many advocates on both sides of the question. Crick makes it clear at once that he is only talking **how it works** not **how it got that way**. He is satisfied that ordinary physics and chemistry tell us how it works and that the theory of evolution is the obvious answer to how life got that way; but he doubts that the process of evolution is predictable. Polanyi, on the other hand, points out that **it is not the ordinary laws of physics and chemistry which are significant for understanding the nature of life, but rather the exceptional boundary conditions through which cells harness the laws to perform new behaviour**. He believes that **the evolution of hierarchical control at higher and higher levels is the essential characteristic of life, but he asserts that although higher levels are dependent on the laws of lower levels, they are not reducible to them**. As Pattee concludes:

> "Viewed from the upper level of the hierarchy the existing constrains are generally taken for granted and the significant question seems to be, **how does it work**. The answer found from this perspective usually amounts to the discovery that **the parts obey the laws of the lower level**. **To this extent there is reduction**. On the other hand, viewed from the lower level of the hierarchy it is the laws of motion which are generally taken for granted and now the significant question seems to be, **how could the constrains arise**. The answer usually given from this perspective amounts to the conclusion that **the constrains are not derivable from the laws of the lower level**. **To this extent reduction appears impossible**" (p. 124). [author's emphasis]

4.A.2.1. Hierarchical Organization

Pattee first limits his use of the idea of hierarchy to **'autonomous'** hierarchies. That is, to

collections of elements which are responsible for producing their own rules, as contrasted with collections which are designed by an external authority to have hierarchical behaviour. What might be called natural hierarchies rather than artificial or supernatural hierarchies, such as man-made machines or 'special creations' of any kind. Secondly, he assumes that **all the elements obey the normal laws of physics**. Thirdly, he limits his definition of hierarchical control to those **'rules'** or **'constrains'** which arise within a **'collection of elements'**, but which affect **'individual elements'** of the collection. This is the normal biological case where, for example, in society a set of laws is enacted by the collective action of the group but applied to individuals of the group; or in the development of the organism, the collective interactions of neighbouring cells control the growth or genetic expression of an individual cell. Finally, he recognizes the essential characteristic of hierarchical organization, that the collective constrains which affect the individuals elements always appear to produce some **'integrated function'** of the collection. In other words, out of the innumerable collective interactions of subunits which constrain the motions of individual subunits, we recognize only those in which we see some coherent activity. **In common language we would say that hierarchical constraints produce specific actions or are designed for some purpose**. At the end, it is good to list the first three conditions for a hierarchy :

1) autonomy, that is, a closed physical system;
2) elements in the system which obey laws of physics;
3) collections of elements which constrain individual elements.

4.A.2.2. Structural Hierarchy and Functional Hierarchy

The question remains what is the physical meaning of a constraint? Pattee (1970) describes that the concept of 'equation of constraint' was in fact first necessary in classical physics because of the lack of any dynamical process to explain the permanent loss of degrees of freedom of collections of matter in solid bodies. Another type of constraint is the boundary condition which limits the values of certain degrees of freedom independently of the equations of motion - for example, when a particle is confined by a box. Both solid bodies as well as walls of boxes could be considered as collections of particles which influence the

motion of individual particles, and so they fulfil the second condition of definition of hierarchy. But while we know that solids can form spontaneously from individual particles, constraints such as boxes are usually designed by experimenters with some 'higher' purpose in mind, and in this case first condition of autonomy would not be satisfied: Pattee concludes:

> "We can see the origin of what are often called **structural hierarchies**.... **The richness as well as the orderliness in all the natural patterns of collections of molecules and crystals could be described as a selective and more or less permanent loss of degrees of freedom among many elements**.... New levels of structural hierarchies depend on the appearance of an imperfection in the old level. But what do we mean by an 'imperfection'? Which imperfections lead to new levels of organization, and which lead to greater disorder?" [author's emphasis]

But, in spite of the enormous complexity which we can find in structural hierarchies, there is still something missing. There is seldom any doubt that such structures are lifeless. What is missing is some recognizable **'function'**. **No matter how intricate a structure may be, permanence is not compatible with the concept of function**. Pattee adds:

> "**Function is a process in time, and for living systems the appearance of time-dependent function is the essential characteristic of hierarchical organization**. To achieve function by permanently removing degrees of freedom in a collection of elements would be impossible. Instead the collection must impose **variable** constraints on the motion of individual elements. In physical language these amount to **time-dependent boundary conditions** on selected degrees of freedom... **the time dependence is not imposed by an outside agent, but is inseparable from the dynamics of the system**. Such constraints have an effect which is like modifying the laws of motion themselves" (p. 127). [author's emphasis]

To put the problem of **dynamical hierarchical control** in a more general way, it is easy to understand how a simple change in a single variable can result in very complicated changes

in a large system of particles. This is the normal physical situation. It is not easy to explain how complicated changes in a large system of particles can repeatedly result in a single variable. It is this latter result which we interpret as the **'integrated behaviour'** or the **'function' of a hierarchical organization**. **Thus, we find structural hierarchies in all nature, both living and lifeless, but functional hierarchies we see as the essential characteristic of life, from the enzyme molecule to the brain and its creations**.

In fact it is the assumption that the elementary motions are complete and deterministic that make the generation of hierarchical rules appear so difficult. The hierarchical rule is superimposed upon a lawful system which is already completely deterministic. How can this be done without contradiction? How can a lawful system of atoms which is maximally deterministic superimpose an additional functional rule or constraint upon its detailed motions? Pattee answers that:

> "**The concept of functional constraint implies an alternative way of representing the detailed motions**. But in a closed physical system there is no observer to represent the system in a different way. Therefore we are left with the idea that if we can recognize a simple hierarchical function in an isolated dynamical system, then we should also be able to recognize an internal **'representation'** or **'record'** of the system's own dynamics. Autonomous hierarchical function implies some form of **'self-representation'**. In other words, we may partially resolve the appearance of hierarchical order on an already completely ordered set of elements by saying that **hierarchical rules do not apply to the elementary motion themselves but to a record of these motions**" (p. 128). [author's emphasis] (see Appendix 2)

What can it mean, then, for a collection of particles to form a self-representation? Clearly in an autonomous hierarchy there must be an internal separation of some degrees of freedom from other degrees of freedom which become constrained to impose collective and time-dependent boundary conditions on individual degrees of freedom:

> "It is in fact, a characteristic difficulty of hierarchical interfaces in biological organizations that their actual operation may appear quite clear while their origin is totally mysterious. Putting it the other way around, I suggests that **'being hierarchic' requires that the system control its dynamics through an internal record, which has some aspects of 'self-observation'**" (Ibid., p. 130).

In following the necessary physical steps leading from the **dynamics of individual units** to the **collective control of individual units**, Pattee believes we can gain some insight into the **spontaneous generation of hierarchical organization**: First, we see that the individual particles or units follow more or less deterministic laws of motion. These units were atoms and molecules in Pattee's examples, but he also think of the units as cells, multicellular individuals, or population units. The 'motions' of these larger units are not as deterministic as the motion of atoms, but they have definite patterns of 'unit' behaviour.

Second, there are forces between 'units' which produce constraints on the individuals. These forces cause **permanent aggregations of units** which act as **relatively fixed boundary conditions on the remaining individuals**. By 'relatively fixed' Pattee means that the rate of growth or change of these aggregations is slow compared to the detailed motion of individual units. **These strong forces form what Pattee called structural hierarchies, but they are essentially passive constraints**.

And finally the third stage is crucial and the most mysterious. If the fixed constraints are not too numerous, that is, if the aggregations are not too rigid, then *weak forces* become important in the internal dynamics of the aggregations and through this *collective* dynamics the aggregations can form *time-dependent boundary conditions* for the other individual units. **This type of flexible constraint reduces the number of possible trajectories of individual units without reducing the number of degrees of freedom. This amounts to a *classification of alternatives* which leads us now to use the higher language of information or control** (Ibid., pp. 133-4).

Therefore, there are two kinds of hierarchical organization: 'structural hierarchy' and

'functional hierarchy' which can be identified by following statements (see Figure 4.3). The author has also compared them in Figure (4.4).

Structural Hierarchy

(Essential Characteristic of all Nature, both Living and Lifeless)
(Selective Permanent Loss of Degrees of Freedom among Many Individuals)
(Ordered Collection of Individuals)
(A Lawful System of Motion of Individuals which is completely Deterministic)
(No Observer to Represent the System in a Different Way)

Functional Hierarchy

(Essential Characteristic of Life)
(Time-Dependent Variable Constraints on Selected Degrees of Freedom)
(Hierarchical Order on Collections of Individuals)
(An Internal Representation or Record of the System's own Dynamics)
(Self Observation in Implying Alternative Ways of Representing of System)

Figure (4.3) 'Structural Hierarchy' and 'Functional Hierarchy' (Source: The Author)

	Character	Freedom	System	Order	Law	Observation
Structural Hierarchy	Essential characteristic of all nature, both living and lifeless	Selective permanent loss of degrees of freedom among many individuals	Closed physical system of individuals	Ordered collection of individuals	A lawful system of motion of individuals which is completely deterministic	No observer to represent the system in a different way
Functional Hierarchy	Essential characteristic of life	Time-dependent variable constraints on selected degrees of freedom	Autonomous systematic representation of individuals	Hierarchical order on collections of individuals	An internal representation or record of the system's own dynamics	Self-observation in implying alternative ways of representing of system

Figure (4.4) The Comparison between 'Structural Hierarchy' and 'Functional Hierarchy' (Source: The Author)

4.A.2.3. The Emergence of Order in Living Organism Processes

Therefore, the emergence of order in living organisms can be identified as Figure (4.5);

1) The Genetic Structure
(The potential Generative Capacity)
(Generating Hypothesis about Environment)
(Distinct Substances - Elements)

Transmission of Information Carried by some Material Structure
'Specific Genes Carrying Information'- 'Carrying Individual Elements'
'Purely Genotypic in Interaction with Environment'

'Symbolic Form' - 'Possibility of Different Statements'
'Deterministic'
'Simply Transmissible'
'Itself Does Nothing to Surrounding'

'Reliability in Storing information'
'Stepping Outside of Constraints Imposed by Physical Laws'
'Generating Structural Hierarchy'

2) The Coherent Function
(The Realization of the Potential Generative Capacity)
(Testing Hypothesis about Environment)
(Formative Idea - Relations)

a) Transmission of Instructions Carried by some Programmes
'Specific Programme Carrying Instructions' - 'Carrying Relations and Roles'
'Elaborately Systematic and Dynamic in Interaction with Environment'

'Stable Form' - 'Homeorhesis against Environmental Influences'
'Non-Deterministic' - 'Conditional Character'
'Simply Programming' - 'Unfoldable'
'Active in Changing Surrounding'

'Reliability in Using Information as Instructions'
'Putting Genes in Proper Place' - 'Speaking to Competent Hearer'
'Generating Functional Hierarchy'

b) Time-Dependent Function Carried by Hierarchical and Dynamical Controls and Rules

'An Autonomous Organized Hierarchical Levels of Authority of Individuals and their Interfaces'

'Systematic Boundary Conditions of Individuals Obeying Deterministic Lows'
'Detailed Facts of each Level'

'Dynamic Control of Individuals with Respect to Hierarchical Rules'
'Self-Observation of each Level'

'Coherent Function of Individuals with Respect to Hierarchical Relations'
'Internal Record of each Level'

'Constrains do not Derive from the Laws of Motion'
'Constrains are not Separable from the Dynamics of the System'
'Constrains do not Apply to the Elementary Motion themselves but to a Record of these Motions'

Figure (4.5) 'Living Organism Processes' (Source: The Author)

Biological theories have now advanced beyond the simple **finite informational concept of cybernetics** towards **'structured information'. It appears, now, to be precisely through the transmission of such 'non-deterministic' but 'unfoldable' symbolic structures that living organisms retain their stable forms yet participate in a gradual evolution**.

In effect as Hillier et al. (1972) state three possible approaches to systemness can be identified (Figure 4.6):

The 'Direct Interaction' or 'General System' Model;
The 'Finite Information' or 'Cybernetic' Model; and
The 'Non-Finite Structured Information' Model of Theoretical Biology.

Figure (4.6) Three Possible Approaches to Systemness (Source: Hillier et al., 1972)

They explain that for the 'general system' model to serve as a basis for a theory of urban systemness at least two conditions have to be fulfilled: "first, **the organising principles of the system have to coincide with the observable elements and interactions**; second, **the system has to manifest its systemness in synchronous three-dimensional space, not in space-time**, since system theory does not regard the time dimension as a source of systemness itself, but as the source of state changes" (Ibid.). To introduce time into the theory of systemness itself requires the transmission of internal structure not an intentionally defined diagram called a structure.

It is in fact, a characteristic difficulty of hierarchical interfaces in biological organizations that their actual operation may appear quite clear while their origin is totally mysterious. The genetic code is a good example of a crucial hierarchical interface that is clear in its operation, but mysterious in its origin. Since it is one general function of hierarchies to simplify a complex situation, Simon (1962) has suggested that if there are "... important systems in the world that are complex without being hierarchic, they may to a considerable extent escape our observation and understanding" (p. 467). Simon has come to a similar conclusion from observing a broad class of hierarchical organizations. He calls **the lower level language a detailed 'state description'** and **the upper level language a simple 'process description'**.

But the fact remains that whether it is the system-observer interface in physics, the structure-function interfaces in biology, or the matter-record interface in the most primitive molecular hierarchies, these levels are presently established only at the cost of creating separate languages for each level (Figure 4.6).

System-Observer Interfaces in Physics

Rule of Combination or Classification
Hypothesis of Randomness
Useful Description of the System in the Observational Environment

Structure-Function Interfaces in Biology

Rule of Relation or Instruction
Hypothesis of a Form or an Idea
Useful Description of the System in the Functional Environment

Figure (4.6) 'System-Observer' and 'Structure-Function' Interfaces (Source: The Author)

Since science has not yet discovered examples of systems where the theory of systemness is given immediately by observables and relations, and since the source of systemness in all biological systems necessarily includes the transmission and transformation of internal structure, it is not clear why there would even be a hope that theories for artificial systems like cities should take the form proposed by observables and relations only.

It is for this reason that for further steps from biological systems towards urban systems the author concludes her inquiry in living organism processes by emphasizing that in biological systems it is recognizable: (1) 'the genetic structured transmissible information' carried by some material structure in *space-time dimension,* and (2) as the source of systemness, the 'time-dependent systematic interaction of elements' carried by some programmed instructions for using this information in *three dimensional synchronous space* (see Figure 4.7). **In other words it is progressive individualization resulting from progressive centralization that certain parts gain a dominant role and so determining behaviour of the whole**. After all, the emergence of order in living organism processes can be characterised as Figure (4.8).

1) **Genetic Structured Information (Elements)**

Transmission of Information Carried by Fixed Material Structure
(Space-Time Dimension)

2) **Coherent Functional Instruction**

Transmission of Instruction Carried by Fixed Programme
Time-Dependent Function Carried by Hierarchical and Dynamical Controls
Autonomous Organized Hierarchical Levels of Authority of Elements
Systematic Interaction of Elements (Relations)
(Three Dimensional Synchronous Space)

Figure (4.7) 'Living Organism Processes' (Source: The Author)

Time-Space Dimension	Three Dimensional Synchronous Space
1) Structured Genetic Information	**2) Functional Coherent Instruction**
Transmission of Information Carried by **Fixed Material Structure**	Transmission of Instruction Carried by **Fixed Programme** Coherent Function Carried by Dynamic Controls Hierarchical Autonomous Organized Levels of Authority of Elements Time-Dependent Systematic Interaction of Elements

Figure (4.8) The 'Emergence of Order in Living Organism Processes' (Source: The Author)

4.A.3. Parts and Whole

In fact, Bertalanffy (1971, p. 10) advocated an organismic conception in biology which emphasizes consideration of the organism as a **'whole'**, and sees the main objective of biological sciences in the discovery of the principles of organization at its various levels: "According to Boltzmann's derivation of the second principle of thermodynamics, **physical events** are directed towards states of maximum probability, and physical laws, therefore, are

essentially **'laws of disorder'**, the outcome of unordered, statistical events[3]. In contrast to this mechanistic view, however, problems of **wholeness**, **dynamic interaction** and **organization** have appeared in the various branches of modern physics" (Ibid., p. 30). It is necessary nowadays **to study not only parts and processes in isolation**, but also to solve the decisive problems found in the organization and order unifying them, resulting from **dynamic interaction of parts**, **and making the behaviour of parts different when studied in isolation or within the whole**: "The theory of unorganized complexity is ultimately rooted in the laws of chance and probability and in the second law of thermodynamics. In contrast, the fundamental problem today is that of **organized complexity**. Concepts like those of organization, wholeness, directiveness, teleology, and differentiation are alien to conventional physics" (Ibid., p. 33).

We realize at once, however, that there are may be systems in equilibrium in the organism, but that the organism as such cannot be considered as an equilibrium system. The doublefaced change of living systems in assimilation and dissimilation manifests - in the words of von Tschermak (1916) - a trend toward maintenance of a certain state, regeneration compensating the disturbance caused by degeneration. So what is the principle of **'automatic self-regulation'** of metabolism? We are possessed of a vast knowledge of physicochemical processes in the cell and in the organism; but we must not overlook the fact 'that even after complete explanation of individual processes, we are worlds away from fully understanding the total metabolism of a cell (Hartmann, 1927, p. 258).

4.A.3.1. Wholeness, Sum, and Mechanization

As Bertalanffy (1971) indicates sometimes "any change in some quantity is a function of the qualities of all elements in a system. On the other hand, a change in a certain element causes a change in all other elements and in the total system. The system therefore behaves as a **'whole'**, the changes in every element depending on all the others" (p. 66). Sometimes a

[3] According to the second principle of thermodynamics, the general trend of events in physical nature is towards states of maximum disorder and levelling down of differences, with the so-called heat death of the universe as the final outlook, when all energy is degraded into evenly distributed heat of low temperature, and the world process comes to a stop. In contrast, the living world shows, in embryonic development and in evolution, a transition towards higher order, heterogeneity, and organization (Bertalanffy, 1971, p. 40).

change in each element depends only on that element itself. Each element can therefore be considered independent of the others: "The variation of the total complex is the (physical) sum of the variations of its elements. We may call such behaviour **'physical summativity'** or **'independence'**" (p. 67). Also he says:

> "We may define summativity by saying that a complex can be built up, step by step, by putting together the first separate elements; conversely, the characteristics of the complex can be analysed completely into those of the separate elements. This is true for those complexes which we may call 'heaps', such as a heap of bricks or odds and ends.... It does not apply to those systems which were called **Gestalten** in German."

Though this is trivial from the viewpoint of physics, it is still necessary to emphasize the non-summative character of physical and biological systems (von Bertalanffy, 1948a, 1960): ".... If you take any realm of biological phenomena, whether embryonic development, growth, activity of the nervous system, etc., you will always find that the behaviour of an element is different within the system from the isolated parts, and you have to take into account **the 'relations' between the various subordinated systems and the systems which are super-ordinated to them** in order **to understand the behaviour of the parts**"(Ibid., 1971, p. 68).

This case is that in which the interactions between the elements decrease with time: ".... In this case the system passes from a state of wholeness to a state of independence of the elements. The primary state is that of a unitary system which splits up gradually into independent casual chains. We may call this **'progressive segregation'**." Therefore:

> "As a rule, **the organization of physical wholes**, such as atoms, molecules, or crystals, results from the union of pre-existing elements. In contrast, **the organization of biological wholes is built up by differentiation of an original whole which segregates into parts**. The reason for the predominance of segregation in living nature seems to be that **segregation into subordinate partial systems implies an increase of complexity in the system**. Such transition towards higher order presupposes a supply of energy, and energy is delivered continuously

> into the system only if the latter is an open system, taking energy from its environment" (Ibid., p. 69). [author's emphasis]

In the state of wholeness, therefore, a disturbance of the system leads to the introduction of a new state of equilibrium. If, however, the system is split up into individual casual chains, these go on independently. As Bertalanffy states: "Increasing mechanization means increasing determination of elements to functions only dependent on themselves, and consequent loss of regulability which rests in the system as a whole, owing to the interrelations present. This fact, which may be termed **'progressive mechanization'**, plays an important role in biology."

It means progress is possible only by passing from a state of undifferentiated wholeness to differentiation of parts. This implies, however, that the parts become fixed with respect to a certain action. Therefore progressive segregation also means progressive mechanization. Progressive mechanization, however, implies loss of regulability. As long as a system is a unitary whole, a disturbance will be followed by the attainment of a new stationary state, due to the interactions within the system. The system is **'self-regulating'**.

4.A.3.2. Centralization

Progressive segregation is often connected with **'progressive centralization'**, the expression of which is the **time-dependent evolution of a leading part**. At the same time the principle of progressive centralization is that of **'progressive individualization'**. An 'individual' can be defined as a centralized system. The primitive state is that where the behaviour of the system results from the interactions of equipotential parts; progressively, subordination under dominant parts takes place. Thus as Bertalanffy explains:

> "..., similar to progressive mechanization a principle of progressive centralization is found in biology, symbolized by time-dependent formation of leading parts. This viewpoint casts light on an important, but not easily definable concept, that of the **'individual'**. 'Individual' stands for 'indivisible'... behaviour is not a result of partial mechanisms of equal rank but dominated and unified by the highest centres of the

nervous system" (1937, pp. 131-9; 1971, p. 72).

Thus strictly speaking, **biological individuality does not exist, but only progressive individualization in evolution and development resulting from progressive centralization, certain parts gaining a dominant role and so determining behaviour of the whole**. Hence the principle of **progressive centralization** also constitutes **progressive individualization**. An individual is to be defined as a centred system, this actually being a limiting case approached in development and evolution so that the organism becomes more unified and 'indivisible' (von Bertalanffy, 1932, pp. 269)[4]: The **'principle of progressive centralization'** expresses the transition from undifferentiated wholness to higher function, made possible by specialization and 'division of labour'; this principle implies also loss of potentialities in the components and of regulability in the whole (Ibid., 1971, p. 225). It is in the same vein that Wiener (1948) states:

> "It is, in fact, scarcely more than a philosophical anticipation of the cell theory, according to which most of the animals and plants are made up of **'units'**, cells, which have many if not all the attributes of independent living organism. The multicellular organisms may themselves be the building bricks of organisms of a higher stage, where the several individuals are modified in different ways to serve the nutrition, the locomotion, the reproduction, and the support of the colony as a **'whole'**." [author's emphasis]

Or Goodwin (1972):

> "Perhaps the most striking fact about embryos and creatures with regeneration powers is **their extraordinary capacity to make 'wholes' out of 'parts'**, to realize themselves as complete entities despite various disturbances. Within several limits

[4] The same applies in the sociological realm: an amorphous mob has no 'individuality'; in order that a social structure be distinguished from others, grouping around certain individuals is necessary. For this very reason, a biocoenosis like a lake or a forest is not an 'organism', because an individual organism always is centred to a more or less large extent (von Bertalanffy, 1971).

> **the developing or regenerating organism undergoes transformation which produce ordered, harmonious, and balanced relationships between their cells, tissues, and organs**. They do this by **the combined processes of differentiation of 'elements' and their cooperative union into the 'whole' which gives meaning to elements**" (p. 378). [author's emphasis]

This is a very remarkable spectacle and not only brings one into a relationship of understanding with the **developmental process**, but also provides a metaphor for **human and social transformations**. Here, too, it is necessary to understand the specific functions of parts and how they may be cooperatively united into wholes. In this relation Koestler (1972) defines: "The evolutionary stability of subassemblies - organs, organ-system - is reflected by their remarkable degree of **'autonomy'** or self-government... each is a subwhole which, towards its subordinated parts, behaves as a self-contained whole, and towards its superior controls as a dependent part. This relatively of the terms **'part'** and **'whole'** when applied to any of its subassemblies is a further general characteristic of hierarchies" (p. 236).

It is again the very obviousness of this feature which tends to make us overlook its implications. A part, as we generally use the word, means something fragmentary and incomplete, which by itself would have no legitimate existence. On the other hand, there is a tendency among holists to use the word 'whole' or 'gestalt' as something complete in itself which needs no further explanation. But wholes and parts in this absolute sense do not exist anywhere, either in the domain of living organisms or of social organization. What we find, as Koestler explains, are intermediary structures on a series of levels in ascending order of complexity, each of which has two faces looking in opposite directions: the face turned towards the lower levels is that of an autonomous whole, the one turned upward that of a dependent part. Koestler has elsewhere (1967) proposed the word 'holon' for these Janus-faced subassemblies[5]. The concept of the holon is meant to supply the missing link between atomism and holism; and to supplant the dualistic way of thinking in terms of 'parts' and 'wholes'.

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[5] From the Greek *holos* = whole, with the suffix *on* (neutr*on*, prot*on*) suggesting a particle or part.

4.A.4. Fixed Rules and Flexible Strategies from Plant to Man

The term holon may be applied to any stable subwhole in an organismic, cognitive, or social hierarchy which displays rule-governed behaviour and/or structural gestalt constancy. Thus biological holons are self-regulating 'open systems' (von Bertalanffy, 1952) governed by a set of fixed rules which account for the holon's coherence, stability, and its specific pattern of structure and function. This set of rules is called by Koestler the **'canon of the holon'**[6]: "The canon determines the fixed, invariant aspect of the open system in its steady state (dynamic equilibrium); it defines its pattern and structure. In other types of hierarchies, the canon represents the codes of conduct of social holons (family, tribe, nation, etc.); it incorporates the 'rules of the game' of instinctive rituals or acquired skills (behavioral holons); the rules of enunciation, grammar, and syntax in the language hierarchy; Piaget's schemes in cognitive hierarchies, and so on. The canon represents the constraints imposed on any rule-governed process or behaviour. But these constraints do not exhaust the system's degrees of freedom; they leave room for more or less flexible strategies, guided by the contingencies in the holon's local environment" (p. 237).

It is essential at this point to make a sharp distinction between the fixed, invariant canon of the system and its flexible (plastic, variable) strategies. A few examples will illustrate the validity of this distinction. Waddington's (1957) 'strategy of the genes' describes: "In **ontogeny**, the apex of the hierarchy is the zygote, and the holons at successive levels represent successive stages in the development of tissues. Each step in differentiation and specialization imposes further constraints on the genetic potential of the tissue, but at each step it retains sufficient developmental flexibility to follow this or that evolutionary pathway, within the range of its competence, guided by the contingencies of the cell's environment."

Turning from embryonic development to the **'instinctive activities'** of the mature animal, we find that spiders spin webs, birds build nests according to invariant species- specific canons, but again using flexible strategies, guided by the lie of the land; the spider may

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[6] The 'organising relations' or 'laws of organization' of earlier writers on hierarchic organization (for example Lioyd Morgan, Woodger (1929), Needham (1941), and the 'system-conditions' in general system theory (Koestler, 1972).

suspend its web from three, four, or more points of attachment, but the result will always be a regular polygon. In **'acquired skills'** like chess also the **rules of the game** define the permissible moves, but the strategic choice of the actual move depends on the environment - the distribution of the chessmen on the board. And in **'symbolic operations'** the holons are rule-governed cognitive structures variously called 'frames of reference', 'universes of discourse', etc., each with its specific 'grammar' or canon; and the strategies increase in complexity on higher levels of each hierarchy. It seems therefore that as Koestler expresses: ".... **Life in all its manifestations, from morphogenesis to symbolic thought, is governed by rules of the game which lend it order and stability but also allow for flexibility; and that these rules, whether innate or acquired, are represented in coded form on *various levels of the hierarchy, from the genetic code to the structures in the nervous system responsible for symbolic thought***" (p. 238). In this relation Wiener (1948) also remindes:

> "... the degree of integration of the life of the community may very well approach the level shown in the conduct of a single individual, **yet the individual will probably have a fixed nervous system, with permanent topographic relations between the elements and permanent connections, while the community consists of individuals with shifting relations in space and time and no permanent, unbreakable physical connections**. All the nervous tissue of the beehive is the nervous tissue of some single bee. How then does the beehive act in unison, and at that in a very variable, adapted, organized unison? Obviously, the secret is in the **intercommunication of its members**.... **The community extends only so far as there extends an effectual transmission of information**" (p. 156). [author's emphasis]

This intercommunication can vary greatly in **complexity** and **content**. With man, it embraces the whole intricacy of language and literature, and very much besides. With the ants, it probably does not cover much more than a few smells and it seems to have a mind almost as patterned as its body. It is what we might expect a priori from an animal whose growing phase and, to a large extent, whose learning phase are rigidly separated from the phase of mature activity. The only means of communication we can trace in them are as general and

diffuse as the hormonal system of communication within the body. Indeed, smell, one of the chemical senses, general and undirectional as it is, is not unlike the hormonal influences within the body. But to quote Wiener (1948) the point is: "The odors perceived by the ant seem to lead to a highly standardized course of conduct; but the value of a simple stimulus, such as an odor, for conveying information depends not only on the **information** conveyed by the stimulus itself but on the **whole nervous constitution of the receiver and the sender of the stimulus** as well" (p. 157).

4.A.4.1. Interlocking Hierarchies and Feedback Control

Koestler (1972) has used the term 'interlocking' or 'interlacing' hierarchies. The most obvious example of interlocking hierarchies is the **sensorimotor** system. The sensory hierarchy processes information and transmits it in **a steady upward flow**, some of which reaches the conscious ego at the apex; the ego makes decisions which are spelled put by **the downward stream of impulses** in the motor hierarchy. But the apex is not the only point of contact between the two systems; they are connected by entwining networks on **various levels**. The network on the lowest level consist of reflexes. They are shortcuts between the ascending and descending flow, like loops connecting opposite traffic streams on a motor highway. On the next higher level are the networks of sensorimotor skills and habits such as touch-typing or driving a car, which do not require the attention of the highest centres - unless some disturbance throws them out of gear. But let a little dog amble across the icy road in front of the driver, and he will have to make a 'top-level' decision whether to slam down the brake, risking the safety of his passengers, or run over the dog, that the subjective experience of free choice and moral responsibility arises.

Koestler explains that the ordinary routines of existence do not require such moral decisions, and not even much conscious attention. They operate by means of feedback loops, and loops-within-loops, which form the multilevelled networks linking the input and output hierarchies. So long as all goes well and no dog crosses the road, the strategy of riding a bicycle or driving a car can be left to the automatic pilot in the nervous system - the cybernetic helmsman. But one must beware of using the principle of feedback control as a magic formula.

4.A.4.1.1. Self-Regulative Hierarchies

As cybernetics took, as starting point, the problem of stable states in dynamic systems, its two fundamental concepts are concerned with the mechanics of such states. The first concept, concerned with how systems could regulate themselves in a variable environment, was that of **'negative feedback'**, for which the early model was the governor on a steam engine and for which the classic metaphor was the horse and rider. The second concept was that of **'information'**. It is largely these two concepts which have been usefully applied in number of scientific fields, including parts of biology, physiology and even psychology. In this relation Bertalanffy (1971) has argued:

> "An open system may 'actively' tend toward a state of higher organization, i.e., it may pass from a lower to a higher state of order owing to conditions in the system. A feedback mechanism can 'reactively' reach a state of higher organization owing to 'learning', i.e., information fed into the system. In summary, the feedback model is pre-eminently applicable to 'secondary' regulations, i.e., regulations based on structural arrangements in the wide sense of the word. Since, however, the structural arrangements in the organism are maintained in metabolism and exchange of components, 'primary' regulations must evolve from the dynamics in an open system. Increasingly, the organism becomes 'mechanized' in the course of development; hence later regulations particularly correspond to feedback mechanisms (homeostasis, goal-directed behaviour, etc.)" (p. 158).

Actually, in several senses both Bertalanffy and Wiener agree that a system model which dealt only with the direct interaction of elements could never explain systems above the level of the single biological organism (Hillier et al., 1972, p.47). But Koestler argues that the concept of feedback without the concept of hierarchic order is like the grin without the cat:

> "**All skilled routines follow a pre-set pattern according to certain rules of the game**. These are fixed, but permit constant adjustments to variable environmental conditions. **Feedback can only operate within the limits set by the rules** - by the canon of the skill. **The part which feedback plays is to report back on every step**

in the progress of the operation, whether it is overshooting or falling short of the mark, how to keep it on an even keel, when to intensify the pace and when to stop. **But it cannot alter the intrinsic pattern of the skill**" (Ibid., p. 241).

4.A.4.1.2. Self-Awareness Hierarchies

To quote Paul Weiss (1951): "**The structure of the input does not produce the structure of the output, but merely modifies intrinsic nervous activities, which have a structural organization of their own**." Therefore one of the vital differences between the simple stimulus-response model and ours is that, "**according to the former, the environment determines behaviour, whereas according to the latter, feedback from the environment merely guides or corrects or stabilizes pre-existing patterns of behaviour**" (Koestler, 1972, p. 241-2). It is described by Boulding (1956) that:

> "... **as we move upward from the plant world towards the animal kingdom we gradually pass over into a new level, characterized by increased 'teleological behaviour' and 'self-awareness'**. Here there are the development of specialized information-reporters such as eyes, ears, etc., leading to a huge increase in the intake of information; and also a great development of nervous system, leading ultimately to the brain, as an organizer of the information intake into a **'knowledge structure'** or **'image'**. So **behaviour is not a response to a specific stimulus but to an image or knowledge structure or view of the environment as a whole**" (p. 204).

This image is of course determined ultimately by information received into the organism; the relation between the receipt of information and the building up of an image however is exceedingly complex. It is not a simple piling up or accumulation of information received, although this frequently happens, but a structuring of information into something essentially different from the information itself. As Boulding describes after the image structure is well established most information received produces very little change in the image - it goes through the loose structure, as it were, without hitting it, much as a sub-atomic particle might go through an atom without hitting anything. Sometimes however the information is 'captured' by the image and added to it, and sometimes the information hits some kind of a

'nucleus' of the image and a reorganization takes place, with far reaching and radical changes in behaviour in apparent response to what seems like a very small stimulus. The difficulties in the prediction of the behaviour of these systems arises largely because of this intervention of the image between the stimulus and the response.

Koestler (1972) carries this inquiry into the meaning of current terminology a step further, and asks just what that convenient word **'environment'** is meant to signify. He says "when I am driving my car, the environment in contact with my right foot is the accelerator pedal, its elastic resistance to pressure provides a tactile feedback which helps to keep the speed of the car steady. The same applies to the 'feel' of the wheel under my hands. But my eyes encompass a much larger environment than my feet and hands; they determine the overall strategy of driving. The hierarchically organized creature that I am is in fact functioning in a hierarchy of environments guided by a hierarchy of feedbacks" (p. 242).

One advantage of this operational interpretation is that the hierarchy of environments can be extended indefinitely. When the chess-player stares at the board in front of him, trying to visualize various situations three moves ahead, he is guided by feedbacks from imagined environments. Most of our thinking, planning, and creating operates in such imaginary environments. But to quote Bartlett (1958) "all our perceptions are inferential constructs, coloured by imagination, and so the difference is merely one of degrees. The hierarchy is open-ended at the top."

4.A.4.1.3. Self-Consciousness Hierarchies

Koestler explains when an intent is formed at the apex of the hierarchy, such as signing a letter, it does not activate individual motor units, but triggers off patterns of impulses which activate subpatterns and so on. But this can only be done one step at a time: "the higher centres do not normally have dealings with lowly ones, and vice versa. Brigadiers do not concentrate their attention on individual soldiers - if they did, the whole operation would go haywire. Commands must be transmitted trough 'regulation channels'" (p. 243). This statement looks trivial, but ignoring it carries heavy penalties of a theoretical or practical order: "The stimulus-response theorist's vague reference to 'intervening variables' is a face-

saving manoeuvre to sweep all the essential problems of complex human behaviour, including language, under the laboratory carpet" (Ibid.). As it is explained by Boulding (1956) in addition to all, or nearly all, of the characteristics of animals man possesses **'self-consciousness'**, which is something different from mere awareness. He states:

> "Man possesses **'self-consciousness'**.... His image... has a **'self-reflexive'** quality - he not only knows, but knows that he knows. This property is probably bound up with the phenomenon of **'language'** and **'symbolism'**. It is the capacity for speech - the ability to produce, absorb, and interpret *'symbols'*, as opposed to mere signs like the warning cry of an animal.... Man has an elaborate image of time and relationship.... He exist not only in time and space but in history, and his behaviour is profoundly affected by his view of the time process in which he stands" (p. 204-5).

But, Koestler explains that how a skilled activity, such as writing a letter, branches into subskills which, on successively lower levels of the hierarchy, become increasingly mechanized, stereotyped, and predictable. He says the choice of subjects to be discussed in a letter is vast; the next step, phrasing, still offers a great number of alternatives, but is more restricted by the rules of grammar, the limits of one's vocabulary, etc.; the rules of spelling are fixed, with no leeway for flexible strategies, and, lastly, the muscle contractions which depress the typewriter are entirely automatized. He concludes: "a subskill or behavioural holon on the (n) level of the hierarchy has more degrees of freedom (a larger variety of alternative strategic choices permitted by the canon) than a holon on the (n - 1) level."

However, all skills tend with increasing mastery and practice to become automatized routines. While acquiring a skill we must concentrate on every detail of what we are doing; then learning begins to condense into habit as steam condenses into drops; with increasing practice we read, write, type, drive 'automatically' or 'mechanically' activities. In unexpected contingencies, however, the process can be reversed. Driving along a familiar road is an automatized routine; but when that little dog crosses the road, a strategic choice has to be made which is beyond the competence of automatized routine, for which the automatic pilot in our nervous system has not been programmed, and the decision must be referred to higher

quarters. **The shift of control of an ongoing activity from one level to a higher level of the hierarchy - from 'mechanical' to 'mindful' behaviour - seems to be of the essence of conscious decision-making and of the subjective experience of free will.**

The tendency towards the progressive mechanization of skills has its positive side: it conforms to the principle of parsimony. If we could not hit the keys of the typewriter 'automatically' we could not attend to meaning. On the negative side, mechanization affects first the extremities - the lower subordinate branches of the hierarchy, but it also tends to spread upward. Koestler expresses that: "If a skill is practised in the same unvarying conditions, following the same unvarying course, it tends to degenerate into stereotyped routine and its degrees of freedom freeze up. Monotony accelerates enslavement to habit; and if mechanization spreads to the apex of the hierarchy, the result is the rigid pedant" (p. 244). As Bertalanffy wrote, "organisms ***are not*** machines, but they can to certain extent ***become*** machines, congeal into machines" (1952).

Vice versa, a variable environment demands flexible behaviour and reverses the trend towards mechanization. However, Koestler (1972) writes, the challenge of the environment may exceed a critical limit where it can no longer be met by customary routines, however flexible - because **the traditional 'rules of the game' are no longer adequate to cope with the situation**. Then a crisis arises. The outcome is either a breakdown of behaviour - or alternatively the emergence of new forms of behaviour, of original solutions. They have been observed throughout the animal kingdom, from insects onward, through rats to chimpanzees, and point to the existence of unsuspected potentials in the living organism, which are inhibited or dormant in the normal routines of existence, and only make their appearance in exceptional circumstances. **They foreshadow the phenomena of human creativity which must remain incomprehensible to the stimulus-response theorist, but appear in a new light when approached from the hierarchic point of view.**

4.A.4.2. Self-Assertion and Integration from Organismic Hierarchies to Social Hierarchies

Under conditions of stress, part of an **organismic hierarchy** may become overstimulated

and tend to escape the restraining control of the whole (Child, 1924). This can lead to pathological changes of an irreversible nature, such as malignant growths with untrammelled proliferation of tissues that have escaped from genetic restraint. There is a whole gamut of mental disorders in which some subordinate part of the mental hierarchy exerts its tyrannical rule over the whole, from the insidious domination of 'repressed' complexes to the major psychoses in which large chunks of the personality seem to have 'split off' and lead a quasi-independent existence. Aberrations of the human mind are frequently due to the obsessional pursuit of some part - truth of a holon masquerading as a whole.

But if we turn from organismic to **social hierarchies**, we again find that under normal conditions the holons (clans, tribes, nations, social classes, professional groups) live in a kind of dynamic equilibrium with their natural and social environment. However, under conditions of stress, when tensions exceed a critical limit, some social holon may get overexcited and tend to assert itself to the detriment of the whole, just like an overexcited organ. It should be noted that the canon which defines the identity and lends coherence to social holons (its laws, language, traditions, rules of conduct, systems of belief) represents not merely negative constraints imposed on its actions but also positive precepts, maxims, and moral imperatives.

As Boulding (1956) explains because of the vital importance for the individual man of symbolic images and behaviour based on them it is not easy to separate clearly the level of the individual human organism from the next level, that of social organizations. So essential is the symbolic image in human behaviour that one suspects that a truly isolated man would not be 'human' in the usually accepted sense, though he would be potentially human. He says:

> "The unit of social systems is not perhaps the person - the individual human as such - but the 'role' - that part of the person which is concerned with the organization or situation in question, and it is tempting to define social organization, or almost any social system, as a set of roles tied together with **channels of communication**. The interrelation of the role and the person however can never be completely neglected - a square person in a round role may become a little rounder, but he also makes the role squarer, and the perception of a role is affected by the personalities of those who

have occupied it in the past" (p. 205).

The single individual constitutes the apex of the organismic hierarchy, and at the same time the lowest unit of the social hierarchy. Looking inward, he sees himself as a self-contained, unique whole; looking outward, as a dependent part. Koestler (1972) states: "No man is an island, he is a holon. His **self-assertive** tendency is the dynamic manifestation of his unique wholeness as an individual; his **integrative** tendency expresses his dependence on the larger whole to which he belongs" (p. 247). Under normal conditions, the two opposite tendencies are more or less evenly balanced. Under conditions of stress, the equilibrium is upset, manifested in **emotional behaviour**. The emotions derived from the self-assertive tendencies are of the well-known aggressive, defensive, hunger, rage, and fear type. The emotions derived from the integrative tendency have been largely neglected by contemporary psychology; one may call them the self-transcending or participatory type of emotions. They arise out of the human holon's need to be an integral part of some larger whole - which may be a social group, a personal bond, a belief-system, or nature. The psychological processes through which this category of emotions operates are variously referred to as projection, identification, empathy, hypnotic rapport, devotion, love. "It is one of the ironies of the human condition that both its glory and its predicament seem to derive not from the self-assertive but from the integrative potentials of the species. The glories of art and science, and the holocausts of history caused by misguided devotion, are both nurtured by the self-transcending emotions" (Ibid.). These two irreducible properties of living matter - that **coincidentia oppositorum** which von Bertalanffy is so fond of quoting - is inherent in the **open-ended hierarchies of life**.

4.A.4.2.1. Symbolic Hierarchies

It is so defined by Boulding (1956) that at the human and societal level we are concerned with the **content and meaning of messages**, the nature and dimensions of **value systems**, the transcription of images into a historical record, the subtle symbolizations of art, music, and poetry, and the complex gamut of human emotion. The empirical universe here is human life and society in all its complexity and richness: "Social life is not something which exists and grows in the abstract. It is a **function of human organisms and of social**

organization.... Knowledge however grows by the receipt of meaningful information - that is, by the intake of messages by a knower which are capable of reorganizing his knowledge" (p. 198). **The whole point of knowledge is that it is itself open-ended, and it can deal with unknown situations by the exercise of judgement**.

Both Bertalanffy and Wiener (Hillier et al., 1972) agree, for example, that the mechanistic interpretation of a feedback cycle as an information system cannot adequately characterise human societies... that life at the human and social level is too bounded up with symbolic systems to be capable of description in terms of either model. As Bertalanffy (1968) states: "**Except for the immediate satisfaction of biological needs man lives in a world not of things but of symbols**."

We may also say that the various symbolic universes, material and non-material, which distinguish human cultures from animal societies, are part, and easily the most important part, of man's behaviour system. It can be justly questioned whether man is a rational animal; but he certainly is a symbol-creating and symbol-dominated being throughout. Symbolism is recognized as the unique criterion of man by biologists, physiologists, psychiatrists, and philosophers (von Bertalanffy, 1971, pp. 228-30), and it is precisely for symbolic functions that 'motives in animals will not be an adequate model for motives in man', and that human personality is not finished at the age of three or so, as Freud's instinct theory assumed. The distinction of **biological** and **specific human values** is that the former concern the maintenance of the individual and the survival of the species; the latter always concern a symbolic universe (Bertalanffy, 1959 and 1964c).

In consequence, mental disturbances in man, as a rule, involve disturbances of symbolic functions. Kubie (1953), appears to be correct when, as a 'new hypothesis' on neuroses, he distinguishes 'psychopathological processes which arise through the distorting impact of highly charged experiences at an early age' from those 'consisting in the distortion of symbolic functions'. Disturbances in schizophrenia are essentially also at the symbolic level and able to take many different forms: Loosening of associational structure, breakdown of the ego boundary, speech and thought disturbances, concretization of ideas, and others.

Bertalanffy (1971) also mentions that:

> "... mental illness is a **specifically human phenomenon**. Animals may behaviourally show (and for all we know by empathy experience) any number of perceptional, motoric and mood disturbances, hallucinations dreams, faulty reactions, and the like. Animals cannot have the disturbances of symbolic functions that are essential ingredients of mental disease. In animals there cannot be disturbance of ideas, ... etc.... Hence, 'animal neurosis' is only a partial model of the clinical entity" (p. 229).

This is the ultimate reason why human behaviour and psychology cannot be reduced to biologistic notions like restoration of homeostasis, conflict of biological drives, unsatisfactory mother-infant relationships, and the like. For the same reason, human striving is more than self-realization; it is directed toward objective goals and realization of values (Frankl, 1959b), **which means nothing else than symbolic entities which in a way become detached from their creators** (von Bertalanffy, 1956a; also 1965). "**The kind of knowledge and skill which is very different from that which we have at lower levels**" (Boulding, 1956, p. 207).

Conclusion of Section 4.A

Perhaps one of the most valuable uses of the above scheme is to prevent us from accepting as final a level of theoretical analysis which is below the level of the empirical world which we are investigating. Because, in a sense, each level incorporates all those below it, much valuable information and insights can be obtained by applying low-level systems to high-level subject matter. Thus most of the theoretical schemes of the social sciences are still at lower levels. Economics, for instance, is still largely a 'mechanics of utility'. Its theoretical and mathematical base is drawn largely from the level of simple equilibrium theory and dynamic mechanisms. It has hardly begun to use concepts such as information which are appropriate at its level, and makes no use of higher level systems. The long inability of psychology to break loose from a sterile stimulus-response model is one of the many other example could be given.

Boulding's discipline (1956) represents an important breakaway from overly simple mechanical models in the theory of organization and control. It emphasizes communication systems and organizational structure, principles of homeostasis and growth, but we must never quite forget that even these advances do not carry us much beyond, and that in dealing with human personalities and organisations we are dealing with systems in the empirical world far beyond the ability of lower organisms or animals kingdom. We should not be wholly surprised, therefore, if our simpler levels, for all their importance and validity, occasionally let us down. To quote Hillier et al. (1972):

> "... science has moved both up and down the scale of phenomena, extending throughout the levels of organisation of matter and life. At one extreme, physics has penetrated to the lowest levels of physical reality, and at the other extreme, the theory of evolution has appeared to open up the higher levels to a scientific enquiry. This differentiation of the universe into a multiple hierarchal level leads to **the problem of relations between the different levels**."

But being hierarchic, requires indeed that the system controls its dynamics through an internal record which has some aspects of self-observation. This type of flexible order reduces the number of possible trajectories of parts or individuals without reducing the number of degrees of freedom.

Humanity is also part of a larger process of nature to which we should contribute in our own way. Our existence is justified only if we cooperate with this process, but not if we violate it. One of our characteristic attributes as human beings is the possession of consciousness. Fulfilment of human potential is possible only if we develop this attribute to the greatest extent we are capable of. This includes the discovery of knowledge, but knowledge must be developed within a context of meaning, not simply for power. **In so far as our actions are dedicated to the enhancement of consciousness for the purpose of achieving wholeness and completion, for healing, making wholes out of parts, our actions are ethical and there will be an experience of meaning in creative participation. This is creative activity which for human beings is inextricably associated with ever-increasing**

consciousness, involving a greater and greater sense of responsibility as one becomes more and more aware of the ways in which parts are and can be united into ever more extensive wholes.

As Goodwin (1972) has mentioned the most striking fact about creatures with regeneration powers is their capacity to make wholes out of parts, to realize themselves as complete entities despite various disturbances: "There are, of course, limits: they are unable to recover from too severe a disturbance. But within these limits the developing or regenerating organism undergoes transformation which produce balanced relationships between their cells. **They do this by the combined processes of differentiation of elements and their cooperative union into the whole which gives meaning to elements**" (p. 378). This is a very remarkable spectacle and not only brings one into a relationship of understanding with the development process, but also provides a metaphor for human and social transformations. Here, too, it is necessary to understand the specific functions of parts and how they may be cooperatively united into wholes. Goodwin states:

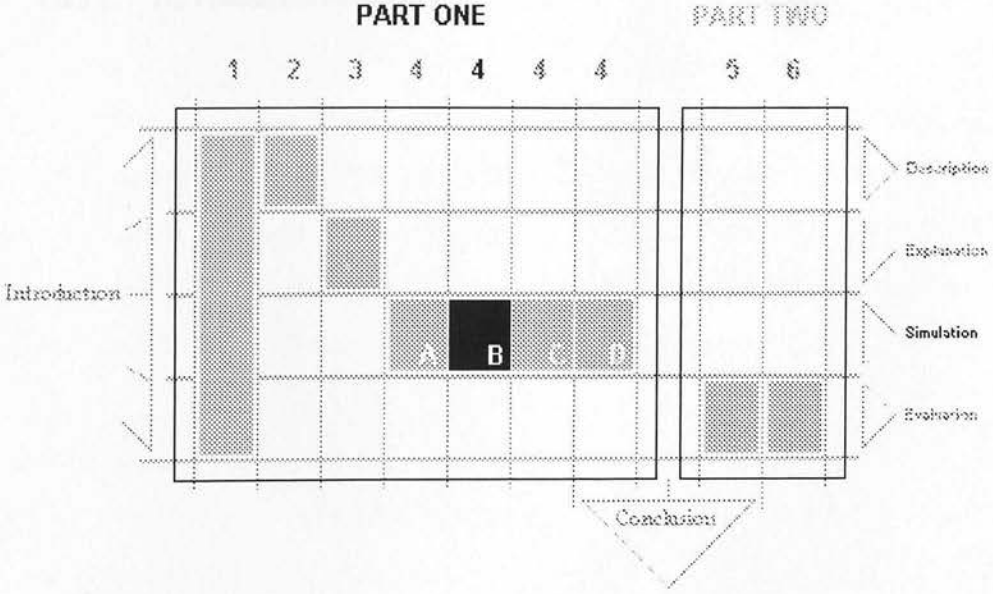
> ".... Psychical and social transformations are potentially unending, new dialectical tensions constantly arises from previous resolutions. It is unlike the embryo which reaches a terminal state in the adult form. The contrast here is the same as that between ontogenetically fixed genetic hypotheses and free, non-terminating mental hypothesis construction" (Ibid.).

This clearly does not give any prescriptions for judging particular actions as ethical or unethical, since ethical choice becomes context-dependent rather than universal. Nor do they provide any automatic criterion of choice. However, there is obviously a very important dimension of value which can enter consciously into this choice, far from necessarily destroying values, can itself become inextricably connected with the conscious exercise of ethical decision. As it is the subject of the next section, life could then become a transformed and transforming activity which engages man totally in responsible creativity, bringing *knowledge* and *power* into union with *meaning* and *wisdom*.

4.B

CHAPTER FOUR

ON PURPOSEFUL IDEAL-SEEKING PROCESSES



4.B

ON PURPOSEFUL IDEAL-SEEKING PROCESSES

Introduction to Section 4.B

The recognition that the human being plays a central role in constructing an image of himself and his world and that these images or internal models or sets of hypotheses are conditioned both by internal (physical) and by external factors provides a degree of freedom which could liberate human creative potential in a dramatic manner, as has occurred in the arts with the dropping of the representational norm, while simultaneously engaging his ethical responsibilities in relation to this freedom. In this relation Goodwin (1972) explains:

> "The contention is two fold: (1) the recognition of man as a creative agent who participates positively and with a degree of freedom in the construction of images of himself and the world imposes a responsibility upon him with respect to his reasons for choosing one image rather than another, and can thus lead to moral involvement in the scientific process; and (2) the realization that Man the Observer is in fact Man the Selector, seeing what he is prepared and able to see, conditioned as he is by his viewpoint, his hypotheses, eliminates the concept of the objective observer and so may lead to a more satisfactory account of the measurement process. The system observes what it is prepared to observe, in the same way that if one constructs a trap for a particle one catches a particle; if for a wave, one catches a wave..." (pp. 368-9).

In the study of artificial intelligence there is currently an active investigation of the exact meaning which is to be assigned to the proposal that a primary function of mind is the generation of images, models, hypotheses about its environment, and the analysis of its consequences in epistemology and metaphysics: "The exploration of the implications of looking upon all organisms as hypothesis-testing systems has not yet, however, begun. It could transform biology by placing model construction and observation at the centre of the biological process, not at the evolutionary periphery, the phenomenon of mind" (Ibid.).

This leads the present section to problem of **purposiveness** which introduces the **types of finality** for its first step. No detailed discussion of the problem of finality is intended by the author, but enumeration of several types may be useful. Bertalanffy has (1971) described:

(1) "**'Static teleology'** or fitness, meaning that **an arrangement seems to be useful for certain purpose**. Thus a fur coat is fit to keep the body warm, and so are hairs, feathers, or layers of fat in animals; [geography, anatomy or frameworks - author's emphasis]

(2) **'Dynamic teleology'**, meaning a **'directiveness of processes'**. Here different phenomena can be distinguished which are often confused:

(i) **'Direction of events towards a final state'** which can be expressed as **if the present behaviour were dependent on that final state**. Every system which attains a time-independent condition behaves in this way; [motion or clockworks - author's emphasis]

(ii) **'Directiveness based upon structure'**, meaning that **an arrangement of structures leads the process in such way that a certain result is achieved**. This is true, of course, of the function of man-made machines yielding products or performances as desired. In living nature we find a structural order of processes that in its complication widely surpasses all man-made machines. Such order is found from the function of macroscopic organs, such as the eye as a sort of camera or the heart as a pump, to microscopic cell structures responsible for metabolism, secretion, excitability, heredity and so forth. Whilst man-made machines work in such a way as to yield certain products and performances, for example, fabrication of airplanes or moving a railway train [cybernetics or control mechanism - author's emphasis], the order of process in living systems is such as to maintain the system itself. An important part of these processes is represented by homeostasis - i.e., those processes through which the material and energetical situation of the organism is maintained constant [self-regulating - author's emphasis];

(iii) There is, however, yet another basis for organic regulations. This is **'equifinality'** - i.e., the fact that **the same final state can be reached from different initial conditions and in different ways** [pre-programmed teleology - author's emphasis]. This is found to be the case in open systems, insofar as they attain a steady state. It appears that equifinality is responsible for the primary regulability of organic systems, i.e., for all those regulations

which cannot be based upon predetermined structures or mechanisms, but on the contrary, exclude such mechanisms and were regarded therefore as arguments for vitalism [a form or an idea - author's emphasis];

(iv) Finally, there is true finality or **'purposiveness'**, meaning that **the actual behaviour is determined by the foresight of the goal**. This is the original Aristotelian concept. It presupposes that the future goal is already present in thought, and directs the present action [desire - author's emphasis]. True purposiveness is characteristic of human behaviour, and it is connected with the evolution of the symbolism of language and concepts" (pp. 78-9) (see also von Bertalanffy, 1965).

The confusion of these different types of finality is one of the factors responsible for the confusion occurring in epistemology and theoretical research: "In the field of man-made things, fitness (1) and teleological working of machines (2. ii) are, of course, due to a planning intelligence (2. iv). Fitness in organic structures (1) can presumably be explained by the casual play of random mutations and natural selection. This explanation is, however, much less credible for the origin of the very complicated organic mechanisms and feedback systems (2. ii). Vitalism is essentially the attempt to explain organic directiveness (2. ii and 2.iii) by means of intelligence in foresight of the goal (2. iv)" (Ibid., pp. 79-80). This leads the study, methodologically, beyond the limits of natural science since as a consequence of the characteristic state of the human being the thesis is dealing with the **'directiveness processes of purposeful systems'**.

4.B.1. Definitions

4.B.1.1. Structure, Function, and Purpose

It is mentioned by Ackoff et al.(1972) that the meaning of **purpose** depends on the meaning of **function** and function is used in contrast with **structure**. Structure is a very general concept that includes geometric, kinematic, mechanical, physical, and morphological concepts. They state: "**Structure** is a general concept applicable to geometric, kinematic, and mechanical properties, and to any properties that can be expressed as functions of them."

Hence, a functional image is completely compatible with one that is mechanistically and structurally oriented. Ackoff et al. (1972) continue: "**Function** is a generic concept as structure is. It is not in any sense opposed to structure but is completely compatible with it." A functional image of nature is completely compatible with one that is mechanistically and structurally oriented. Going beyond, we can construct a set of definitions to identify the members of a hierarchy of functional individuals or systems. This hierarchy is defined in terms of (1) structural characteristics of the individual's or system's action and (2) the functional characteristics of their outcomes.

4.B.1.2. Functional Classification of Systems

Considering various types of functional systems, Ackoff et al. (1972) have categorised as following:

(a-1) Passive functional systems have available to them a uni-unistructural set of actions and a uni-unifunctional set of outcomes. Such a system can do only one structural type of thing in any structurally defined environment. A clock just runs and a compass just points to the north. Such a function would be a consequence of what the environment does to the action of the system rather than what the action does to the environment. Such a function is therefore called **passive**;

(a-2) Passive multifunctional systems have available to them a uni-unistructural set of actiones and a uni-multifunctional set of outcomes. Here, any intrinsic function such a system can display is due to the structural variations in outcomes coproduced by the environment. A simple example of such an entity is the chimney on the factory. It could be shown to have the extrinsic function of waste disposal and the intrinsic function of polluting the surrounding atmosphere;

(b-1) Reactive functional systems have available to them a multi-unistructural set of actiones and a uni-unifunctional set of outcomes. Because they can display different structural behaviours in different environments but only one kind in any one environment, they **react** to environmental changes. State-maintaining systems are a common type of reactive functional

system (see Figure 4.9). A heating system whose internal controller turns it on when the room temperature is below a desired level and turns if off when the temperature is above this level is state-maintaining;

(b-2) Reactive multifunctional systems are ones that have available to them uni-multistructural sets of actiones and uni-multifunctional sets of outcomes. An air-control system that maintains a desired temperature and humidity is a system of this type. Such systems are normally composites of reactive functional systems. Systems that are reactive must be able to **discriminate** between different environments. Furthermore, such systems can adapt to changes in environment, but unlike goal-seeking systems they are not capable of learning because they cannot choose their behaviour. They cannot improve with experience;

(c-1) Goal-seeking systems ones that can respond in structurally different ways to one or more structurally different events, and all their responses have the function of producing a particular outcome, which is its **goal**. It is responsive, not reactive, because it has a choice of responses (see Figure 4.9). If it has memory, it can also increase its efficiency over time in producing the outcome that is its goal. Thus it can **learn** as well as **adapt**. For example, an electronic maze-solving rat is a goal-seeking system that, when it runs into a wall of a maze, moves in a programmed sequence of ways until it finds an open path;

A **process** is a sequence of behaviour that constitutes a system and has a goal producing function. In some well-definable sense each unit of behaviour in the process brings the actor closer to the goal which it seeks. The sequence of behaviour that is performed by the electronic rat constitutes a maze-solving process. After each move the rat is closer to solve the maze. The metabolic process in living things is a similar type of sequence the goal of which is acquisition of energy or, more generally survival. **Production processes** are a similar type of sequence whose goal is a particular type of product. Process behaviour displayed by a system may be either reactive, responsive, or active;

(c-2) Multi-goal-seeking system one that is goal-seeking in each of two or more structurally different environments, and seeks different goals in at least two different environments.

Systems of this type can pursue different goals, but they do not determine the goal to be pursued - the environment does (see Figure 4.9). However such systems choose the **means** by which to pursue their goals. A computer programmed to play more than one game is multi-goal-seeking. The game it plays is not a matter of its choice; it is usually determined by an instruction from an external source;

(d) Purposeful system one that can produce (1) **the same functional type of outcome in different structural ways in the same structural environment** and (2) **can produce functionally different outcomes in the same and different structural environments** (pp. 28-31) (Figure 4.9).

Type of System	Function of System	Outcome of Function
State-Maintaning	Variable but Determined (Reactive)	Fixed
Goal-Seeking	Variable and Chosen (Respective)	Fixed
Multi-Goal-Seeking and Purposive	Variable and Chosen	Variable but Determined
Purposeful	Variable and Chosen	Variable and Chosen

Figure (4.9) Functional Classification of Systems (Source: Ackoff, 1971)

4.B.2. Purposeful Systems

Therefore, a purposeful system is one which can produce the same outcome in different ways in the same (internal or external) state and can produce different outcomes in the same and different states (Ackoff, et al., 1972): "... **a purposeful system is one that can change its goals in constant environmental conditions; it selects goals as well as the means by which to pursue them. It thus displays will**. Human beings are the most familiar examples of such systems" (p. 31).

4.B.2.1. The process of pursuing purposes

In previous heading the components and parameters of purposeful behaviour were identified. This heading regards **the process that makes purposeful behaviour possible**. The steps in

this process, as defined by Ackoff et al. (1972), the subprocesses, themselves constitute a system. The objective, therefore, is both to identify the subprocesses and to show how they interrelate so as to form a system of purposeful behaviour.

As a summary, first it is concerned with the processes by which information about or relevant to a situation is obtained from the environment, including others in it, and from oneself. The three basic processes involved are **perception**, **consciousness**, and **memory**. Together they provide a **description** (an **image**) and an **explanation** (a **conception**) of the situation, which generate a set of **beliefs** about the situation that are organized into a **model** or representation of it.

Therefore, it is then concered with the types of beliefs required to represent a situation adequately and the measures appropriate to them. And then, how the situation as modeled is evaluated - that is, whether it produces a state of *satisfaction* or *dissatisfaction* in the purposeful individual. Various types of satisfaction and dissatisfaction are identified with different **feeling** and **attitudes**. **Choice** situations in which dissatisfaction is produced in a purposeful individual in a state of doubt about what should be done constitute to that individual a **problem** situation in which a **decision** is required.

And finally, the various processes by which dissatisfaction can be removed from a problem situation is discussed - how it can be *dissolved*, *resolved*, or *solved*. The solution process itself is examined relative to different types of problem, and the author discusses the role of experience, **intuition**, **thought**, and **feeling** in reaching a solution. Hence, first of all is the generation of inputs which is explained by Ackoff et al. (1972) as following:

4.B.2.1.1. Generation of Inputs: Perception, Consciousness, and Memory

In the processes of providing the inputs to purposeful choices, "the basic one is *perception*, a **functional response to a stimulus**. The second is *consciousness*, **the perception of the mental state of another or oneself**. The third is *memory*, which enables an individual to respond at one moment of time to something he has sensed earlier. It is through memory that **experience can come into play at a later date**" (p. 77).

A purposeful individual who perceives something, may respond to either its structural or its functional properties. The set of structural properties of the stimulus he responds to constitute his *image* of the stimulus. The set of functional properties of the stimulus he responds to constitute his *conception* of the stimulus. Thus we can speak of both his image and his conception of the choice situation: "**A purposeful individual's *model* of a choice situation is the set of structural and functional properties that he believes the choice situation to have and that he believes affect his satisfaction and dissatisfaction with the situation**."

But what an individual perceives in a situation is not merely a matter of what is *given* to him by the situation, because much more is *offered* by it than he can possible receive: "What he perceives is a matter of what he *takes*. He enters such a situation with a set; the set is his model of the situation. It provides him with criteria of relevance and hence influences what he looks for" (Ibid.).

What an individual perceives, is conscious of, and remembers in a choice situation and what he feels about it constitute the raw material from which his model of the situation is constructed. Therefore, **his model influences what he takes from the situation, and what he takes from it influences his model**. Thus it should be borne in mind that perception, consciousness, remembering, and model construction go on simultaneously and interdependently (Ibid., p. 78).

4.B.2.1.2. Modeling the situation: Beliefs

Ackoff et al. (1972) also explain that an individual's model of a choice situation is his representation of it: "Models are used in such situations because they are easier to manipulate than is reality itself. In many cases it is clearly preferable to make one's trials and errors with a model rather than with reality. **The relative ease of model manipulation derives both from their consisting of images and concepts that are usually easier to manipulate than is reality, and from their being usually simpler than reality**" (p. 79).

Every situation also has an unlimited number of properties, but only comparatively few of these are relevant to a particular choice. **Hence models of choice situations are selective**.

For example, in the physicist's model of a falling body he may relate its acceleration to such properties as mass, shape, and wind currents, but not to colour, age, cost, and chemical composition: "A model includes only those properties that either the individual believes have an effect on the outcomes of interest (and therefore are relevant), or that he is doubtful about and wants to investigate further" (Ibid.).

Neither the model nor the way it is used may be made explicit in a choice situation; in fact, the subject may be quite unconscious of both. By uncovering a subject's relevant beliefs, his implicit model can be revealed: "The beliefs of a purposeful system can be categorized as beliefs about the components of the model of a purposeful state - courses of action, outcomes, relevant state variables, efficiencies, relative values, and so on. **If the individual has doubt about any of these, it will be reflected in his evaluation of his model and possibly in the design of data acquisition and evaluation**. The intensity of these beliefs affect the amount of data he requires to confirm or disconfirm his beliefs" (p. 99).

4.B.2.1.3. Evaluating the Situation: Feelings and Attitudes

When part or all of a situation is observed, it is susceptible to evaluation by the observer. If the situation oberved is a product of the observer's earlier action, then the outcome of that action can be evaluated. The essential characteristic of such evaluations is the decision to change or retain the situation and/or the observer's relation to it. Hence the value placed on what is observed is the **intention to change or retain it**: "Evaluations are intentions. Intentions produced by what is observed - that is, intention responses - are feelings. Therefore, when we study intentions from the point of view of what produced them, we study feelings. Feelings are about something, they are about what produced them, what they are responses to" (Ackoff et al., 1972, p.100). Therefore "... **a feeling is a functional property of an individual. It is an intention to change or retain something, an intention produced by that something**" (Ibid., p. 101).

A choice situation in which (1) an individual is dissatisfied with that situation as he has modeled it and (2) he has doubts about which course of action to select is a problem situation to that individual. If there is no dissatisfaction in a choice situation, then there is no need for

a choice. If there is dissatisfaction but no doubt over what to do about it, there is no problem because the choice is apparent. **Thus a problem consists of a situation in which an individual wants to determine how to remove his dissatisfaction** (Ibid., p.107).

4.B.2.1.4. Formulation and Evaluation of Choices: Thought and Intuition

Therefore, problem means a purposeful state that a purposeful individual is dissatisfied with, and in which he is doubtful about which of the available courses of action will change that state to a satisfactory one. Ackoff et al. (1972) propose that a purposeful individual has three different ways of disposing of a problem: dissolution, resolution, and solution:

> "A purposeful individual can derive (infer) courses of action from his model of a problem situation; that is, the beliefs incorporated into his model can produce a belief about which courses of action are possible and which of these will produce a state of satisfaction. The derivation may be **conscious and thus be obtained through thought**, or it may be **unconscious and hence be obtained by intuition**. Or from other hand, a course of action may be **selected by a guess or be chosen arbitrarily** (as by a random choice). In guessing and arbitrary choice, inference is not involved" (p.116).

Inference is a procedure by which a set of beliefs or assumptions in the form of premises, formation rules, and transformation rules produces another set of beliefs or assumptions. The process is deductive if it proceeds from the general to the specific, and inductive if it proceeds from the specific to the general. An individual's inferential process is his logic (Ibid.).

4.B.2.2. The Product of the Process of Pursuing Purposes: Choices

Once a model is accepted, a choice of a course of action can be made. *Intuition* suggests possible courses of action that can be evaluated by use of the choice model and the process of *thought.* The model itself is the product of past and present *observations* or, more generally, *perceptions.* The consequences predicted are evaluated by *feelings.* A course of action that is predicted to yield satisfaction is selected. It is apparent that thought, intuition, perception, and feeling all are involved in choice. The manner in which they are involved

suggests the pattern of inquiry followed by purposeful systems.

It can be therefore concluded that the role of perception is to provide information. This affects possible choices. The contributions of the senses, present and past, when believed or assumed become the raw material from which a model of the choice situation is constructed. A course of action can be defined so by a set of values of the controlled variables. The perception of a possible course of action, when it just pops up, is a product of intuition: "Not all suggestions, however, are intuitive; they can also be the result of thinking over the situation, derived from what is known or believed about the situation" (Ibid., p. 134).

Hence, a suggestion becomes an idea only when it is evaluated by a **thought process** that **employs the inputs of perception and feeling**. Evaluation here means predicting whether or not a suggested course of action will produce a desired outcome in the situation involved: "Possible courses of action can be evaluated either by predicting their consequences by using what is believed about the situation (**a thought process**), or by trying them and observing the consequences and evaluating them (**feeling**)." These are not exclusive processes. Every evaluation of a possible course of action involves all of these functions, but the one that dominates may differ from evaluation to evaluation, or from evaluator to evaluator, depending on the individuality of the system. It is stated by Ackoff et al. (1972) that:

> "Thinking is an operation, and what it operates on are concepts, images, and signs of these. Meanings are contained in beliefs about consequences of courses of action that can be taken, and beliefs are expressible in sign complexes that are **statements** or propositions. **Thus thought presupposes at least a private** (if not a public) **language**. **Thought involves the manipulation of signs**. **Hence it is only by communication with himself that a subject can think**.... Thinking involves a conversation with oneself. **Therefore, not only do we have to understand choice to understand communication, but we also need to understand communication in order to understand choice**" (p. 134).

In a sense, thought relates concepts, images, and beliefs. The product of the process is **either**

a conclusion that is believed and hence becomes a basis for selecting a course of action, or a conclusion that can be tested (tried, observed, and evaluated). The choice process has no fixed sequence of a fixed number of steps. One choice situation arises out of another in a continuing stream. Several problems may coexist and interact. Hence the process of choice is very rich; it can be infinitely varied. It is a process in which each step can feed back to every other. And the main point to emphasize is that "**choice involves not only obtaining information about and from the environment** (which may include other purposeful systems) **but also communicating with oneself** (in thought)." (see Chapter 4 Section C on the process of thought)

4.B.3. Instruments

An instrument is an object that coproduces the outcome of an individual's or system's action; the coproduction is itself produced by the individual or system. Thus: "**an instrument is a device used by a functional individual or system in its functional behaviour**" (Ibid., p. 31). A hammer and the behaviour of a carpenter coproduce the driving of a nail; the coproduction is produced by the carpenter. Hence the hammer is the carpenter's instrument.

The instrument employed by an individual or system operating at any functional level is always at a **lower** level than the level of the individual or system that uses it: "If a purposeful individual (A) wants to use another purposeful individual (B) as an instrument, he can do so only by restricting the **choices** of B so that B acts at less than the level of purposefulness." A master thus uses his slave as goal-seeking or lower, not as purposeful. The master imposes his goals on the slave.

On the other hand, a goal-seeking system such as a volunteer fire department uses its equipment as instruments. These are not goal-seeking but of a lower functional type. The community that uses this department, however, is of a higher type - at least multi-goal-seeking. A purposeful system (such as a person) can receive assistance from another such system if the second **cooperates** with the first. But in such interaction the second person is not an instrument of the first unless he is malevolently exploited by the first. In such exploitation the options of one are reduced and those of the other are increased. The parts of

a system may, in some circumstances, be instruments of the system (as the parts of an automobile are to an automobile), or the parts may use the system as an instrument (as the members of a democratic community) (Ackoff et al., 1972, p. 32).

The author's main concern will be with the representation of individual purposeful systems rather than with goal-seeking or multi-goal-seeking systems. The author believes that only at this level can systems theory contribute to the core problems of psychology, sociology, and anthropology. The concepts the author will use as a basis for her analysis are those required to define a **purposive state** - that is, the behavioral state of a purposeful individual or system.

4.B.4. Ideal-seeking Systems

Ideal-seeking systems form an important subclass of purposeful systems. Before making their nature explicit we must consider the differences between goals, objectives, and ideals and some concepts related to them. The differences to be considered have relevance only to purposeful systems because only they can choose **ends**. **A system which can choose between different outcomes can place different values on different outcomes**. In this relation Ackoff (1971) states: "The **'goal'** of a purposeful system in a particular situation is a preferred outcome that can be obtained within **a specific time period**. But the **'objective'** of a purposeful system in a particular situation is a preferred outcome that cannot be obtained within a specified period but which can be obtained over **a longer time period**" (pp. 666-7).

It means, we may consider a set of possible outcomes ordered along one or more scales. Then each outcome is closer to the final one than those which precede it. Each of these outcomes can be a goal in some time period after the 'preceding' goal has been obtained, leading eventually to attainment of the last outcome, the objective. For example, a student's goal in his/her first year is to be promoted to his/her second year. Passing his second year is a subsequent goal. And so on to graduation, which is his objective. **Pursuit of an objective requires an ability to change goals once a goal has been obtained**. This is why such pursuit is possible only for a purposeful system. Also, Ackoff (1971) states: "An **'ideal'** is an objective which cannot be obtained in any time period but which can be approached without limit. Just as goals can be ordered with respect to objectives, objectives can be ordered with

respect to ideals. But an ideal is an outcome which is unobtainable in practice, if not in principle" (p. 667). For example, an ideal of science is errorless observations. The amount of observer error can be reduced without limit but can never be reduced to zero:

> "Ideal-seeking system is a purposeful system which, on attainment of any of its goals or objectives, then seeks another goal and objective which more closely approximates its ideals. **An ideal-seeking system is thus one which has a concept of 'perfection'[1] or the 'ultimately desirable' and pursues it systematically; that is, in interrelated steps**" (Ibid.). [author's emphasis]

Many wise men have observed that there is more satisfaction in pursuing an end than in attaining it; to play a game well yields more satisfaction than does winning it. Also, some have observed that the researcher's and manager's objective is not much to solve problems as it is to create more challenging and important problems to work on by solving the one at hand. **This is to say that the continuous pursuit of more desirable ends in an end in itself, and hence attainment of a specific end can be conceptualized as a means to such pursuit**.

Such observations suggest that a pervasive objective of man and the social systems of which he is a part is the successful pursuit of increasingly desirable objectives. If this is so, then it is reasonable for man and the social systems of which he is part to formulate objectives that can be pursued without end but can be continually approached. Ackoff et al. state: "**Man seeks objectives that enable him to convert the attainment of very goal into means for the attainment of a few and more desirable goal**. The ultimate objective in such a sequence cannot be obtainable; otherwise its attainment would put an end to the process. **An end that satisfies these conditions is an idea**" (p. 237). And also "... **ideal pursuit can provide cohesiveness and continuity to extended and unpredictable processes, to life and history**. **Thus the formulation and pursuit of ideals is a means by which man puts meaning and significance into his life and into the history of which he is a part**. **It also provides the possibility of deriving satisfaction from a life that must end but can**

[1] Perfection, n. An imaginary state or quality distinguished from the actually an element known as excellence: an attribute of the critic. The Devil's Dictionary.

contribute to a history that may not" (Ibid.).

Speculation about ideals and their pursuit has been engaged in almost exclusively by philosophers. Ideals have received almost no attention from scientists that justification for identifying any ideal with the Ultimate Good is not a scientific matter. Suppose, however, that we could specify an ideal whose attainment logically entails the ability to attain any other ideal and without whose attainment no other ideal could be attained; then we would have identified a necessary and sufficient condition for ideal pursuit. Consequently, an analysis of the functions required for pursuit of this ideal could provide insight into the general nature of ideal-seeking systems.

4.B.5. The Process of Thought

Therefore, in addition to all characteristics of living systems man possesses self consciousness whose image has a self-reflexive quality that is bound up with the phenomena of language and symbolism. He is also an example of purposeful systems who can change his goals under constant conditions. He selects ends as well as means and thus displays will. And, also, in the extreme form he is an example of ideal-seeking systems which has a concept of 'perfection' or the 'ultimately desirable' and pursues it systematically; that is, in interrelated steps (Figure 4.10).

Type of Level	Type of System	Type of Programme, Order	Outcome of Function
Plant	Self-Maintenance	Pre-Programmed	Fixed Genetic
Animal	Self-Awareness	Autonomous	Fixed Knowledge
Man - Society	Self-Consciousness Self-Ideal	Self-Reflexive Purposeful	Open-Ended Symbolic Open-Ended Ideal

Figure (4.10) Levels of Order (Source: The Author)

Hence, man's thought in the process of pursuing purposes including: inputs, process, and outputs (Figure 4.11) leading to its progressive replacement, retains its internal coherence,

unity and identity. The product of the process is either a conclusion that is believed and hence becomes a basis for selecting a course of action, or a conclusion that can be tested (tried, observed, and evaluated).

Inputs:	[Perception, Consciousness, and Memory]
Process:	[Modelling the Situation: Beliefs] [Evaluating the Situation: Feelings and Attitudes]
Outputs:	[Formulation and Evaluation of Choices: Thought and Intuition]

Figure (4.11) The Process of Pursuing Purposes (Source: The Author)

In other words, according to Figure (4.10), the study proposes that any individual human in order to follow his/her purposes, **first** continiously forms his/her systematic purposeful functions, freely in terms of means and ends, in three dimensional synchronous space; and **second**, for maintaining their progressive coherence and identity, to get closer to his/her ultimate ideals, gradually builds the structure of laws of his/her thought in space-time dimension. It suggests that it is in fact only through the transmission of the structure of thought of the subject that the process of pursuing purposes retains its stable form yet participate in a gradual evolution. As mentioned before, **this is because of the fact that the product of this process i.e. choices involves not only obtaining information about and from the environment** (which may include other purposeful systems) **but also communicating with oneself in thought** (it is only by communication with oneself that a subject can think). It involves the manipulation of concepts, images, and **signs** of these which prepares him/her to understand choice. Actually at this level we are concerned with the content and meaning of the messages. Knowledge however grows by the receipt of meaningful information and the whole point of knowledge is that it is itself open-ended. It can deal with unknown situation by the exercise of judgement which it is itself potentially unending, and new dialectic tensions constantly arises from previous resolutions (for more details see Chapter 4 Section C on the process of thought).

But, as we noticed in the previous section (Chapter 4 Section A), **the unit of social systems is not the individual human but the 'role' that part of the person which is concerned**

with the organization, and this defines any social organization as a set of 'roles' tied together with channels of 'communication'. This defines, therefore, any social system as a programmed activity with shifting relations in time and space. That its function is a process in time, and for a social system the appearance of time-dependent function is the essential characteristic of its hierarchical organization (Barghjelveh, 1996). It is in fact the relationships between what purposeful elements do and the pursuit of their common purpose that gives unity and identity to their organization (Ackoff, 1972). In this respect, therefore, the formative idea of programme imposes **variable** constraints on the purpose of individuals.

It is for this reason that for further steps from purposeful systems towards urban systems the author concludes her inquiry into ideal-seeking processes by emphasizing that, unlike living organisms that in them there are: first (1) 'structured transmissible information' (i.e. 'elements') in *time-space dimension*; and second (2) 'systematic interaction of elements' (i.e. 'relations') in *three dimensional synchronous space*, in all purposeful systems it is recognizable that there are: first (1) as the source of systemness, generation of 'systematic interaction of individuals' carried by 'purposeful social relations' in *three dimensional synchronous space;* and second (2) for transfering more useful information in order to get the ideal perfection, generation of 'structured symbolic transmissibe information' carried by some 'material elements' in *space-time dimension* which both together creat the lawful structure of the thought of the subject (Barghjelveh, 1996) (see Figure 4.12). Consequently, the process is reverse.

Fixed Genetic Life
1) Structured Transmissible Information (Elements)
(Time-Space Dimension)
2) Systematic Interaction of Elements (Relations)
(Three Dimensional Synchronous Space)

Open-Ended Lawful Thought
1) Generation of Systematic Purposeful Interaction of Individuals (Relations)
(Three Dimensional Synchronous Space)
2) Generation of Structured Symbolic Transmissible Information (Elements)
(Time-Space Dimension)

Figure (4.12) The Comparison Between Genetic Life and theLawful Process of Thought (Source: The Author)

Therefore, the study proposes the emergence of order in purposeful ideal-seeking processes as Figure (4.13). According to the generation of 'systematic interaction of purposeful individuals' - followed by the process of pursuing purposes including inputs, process, and outputs - the 'autonomous organized hierarchical levels of authority of individuals' is realized. It is in fact 'time-dependent functions carried by hierarchical and dynamic controls'. It regulates the 'transmission of the instruction of the subject carried by open-ended purposeful programmes'. **It is in fact progressive individualization resulting from progressive centralization that certain individuals gain a dominant role and so determining behaviour of the -** generation of the *coherent functional instruction* of the purposeful subject in a three dimensional synchronous space.

It is also through the 'transmission of the useful information carried by open-ended symbolic material structure' which ideal-seeking processes gain the generation of *symbolic structured information* of elements in a space-time dimension.

(Three Dimensional Synchronous Space)

Process of Inputs, Process, and Outputs

Inputs:	Perception, Consciousness, Memory	
Process:	Modelling the Situation:	Beliefs
	Evaluating the Situation:	Feeling, Attitudes
Outputs:	Formulation & Evaluation of Choice s:	Thought

Generation of Purposeful Systematic Interaction of Individuals (Relations)

Autonomous Organized Hierarchical Levels of Authority of Individuals

Time-Dependent Functions Carried by Hierarchical and Dynamical Controls
Transmission of Instruction Carried by Open-Ended Purposeful Programmes

1) **Generation of Purposeful Functional Instruction**

(Space-Time Dimension)

Transmission of Useful Information Carried by Open-Ended Symbolic Material Structure

2) **Generation of Symbolic Structured Information (Elements)**

Figure (4.13) 'Purposeful Ideal-Seeking Processes' (Source: The Author)

4.B.5.1. The Process and the Control

Cosequently, any persisting pattern of activity that can be described as a system must involve processes that hold it together; otherwise it would tend to degenerate. So the **structure and process** of a system and the **control** of the system are two sides of the same coin. There are different types of control as Carter et al. (1984) explain:

(a) The natural ecosystems of tropical rain forests illustrate the most basic form of control. They can be stable for millennia, with no sense of purpose, no special controller, no free choice, no grand design. They are controlled by an immensely complex **'self-maintaining causal network'** that will hold itself in the same general state indefinitely, unless it is radically destabilised (as in human forest clearance schemes) by changes too drastic for the network to absorb. Here are some other much simpler networks quoted by them that enhance or resist change (see Figure 4.14).

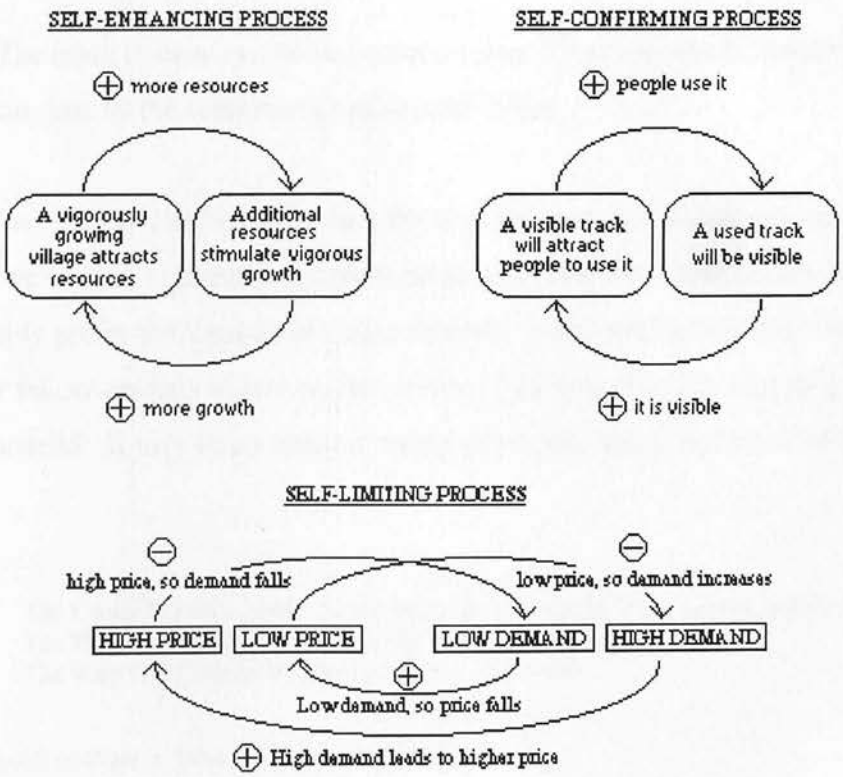


Figure (4.14) Different Types of Control (Source: Carter et al., 1984)

(b) Purposive control is more sophisticated in that there are specialised control sub-systems, directed to achieving the goal, but the goal itself is still pre-set. This is **'purpose without choice'**, like the migrating bird, programmed and controlled by inherited instinct or learned habit to aim for one goal: home.

(c) Deliberately controlled human activity is the most complex form of control. It can be called purposeful control, **'purpose with choice'**. It involves:

(c-1) Specialised arrangements for decision making and control (e.g. while the fields get on with the growing, the farmer specialises in planning and control);

(c-2) Free choice amongst a number of competing alternatives (e.g. there are alternative patterns of crops that the farmer might grow; he can choose between them or whatever criteria he wishes); and

(c-3) The result is some sort of blue-print or plan. What happens is determined by the plan, not just by the working out of natural forces.

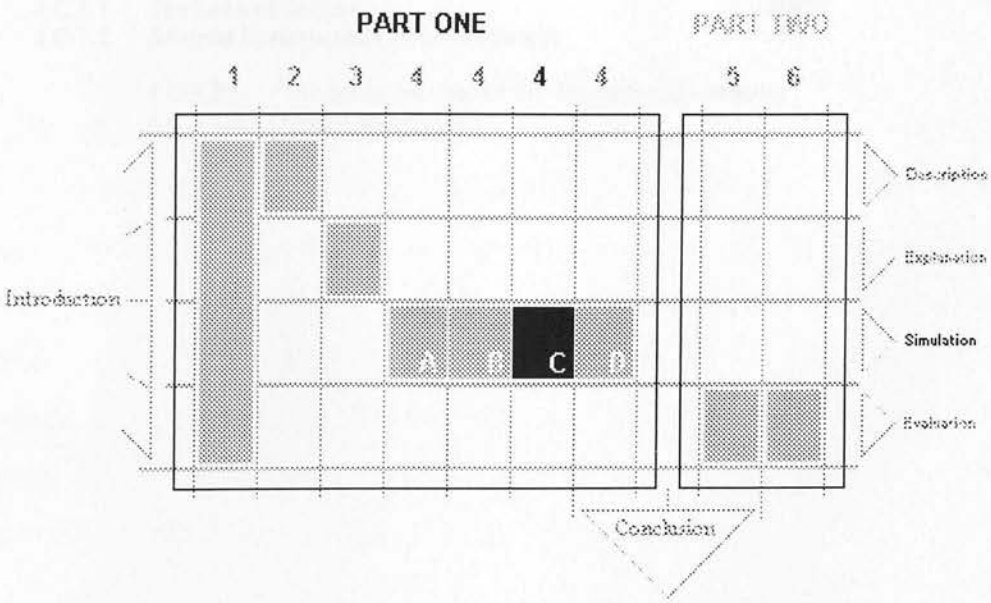
Therefore as Carter et al. (1984) distinguish the emphasis we choose depends on our beliefs and values. If we want to regard human behaviour as economically or ecologically determined, we will probably prefer the 'causal net' rather than the 'purposeful' model (sse Figure 4.15). If we see our fellow animals as having the power of choice, then the migrating birds may become 'purposeful'. It may be as much a matter of respect and affection as of intellectual argument.

The 'Causal Network' Model Emphasises Systemic Factors but Underplays Individual Choice.
The 'Purposive' Model Emphasises the Process of Pursuing a Target.
The 'Purposeful' Model Emphasises the Act of Choice.

Figure (4.15) Levels of Control (Source: Carter et al., 1984)

CHAPTER FOUR

THE PROCESS OF THOUGHT



4.C

THE PROCESS OF THOUGHT

Introduction to Section 4.C

4.C.1. Obtaining *Information* - Communication

4.C.1.1. The Nature of Communication

4.C.1.1.1. Information (Changes in Probabilities of Choice)
4.C.1.1.2. Instruction (Changes in Efficiency of Choice)
4.C.1.1.3. Motivation (Changes in Values)

4.C.1.2. Signs, and Symbols
4.C.1.3. Meanings, and Messages

4.C.2. Making Transmissible *Information* - The Structure of Thought

4.C.2.1. Language

4.C.2.1.1. The Laws of Language
4.C.2.1.2. The Laws of Thought
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4.C.3. Examining the Structure of Thought across Space and Time - The Function

4.C.3.1. The Laws of Society
4.C.3.2. Abstract Systems and Concrete Systems

4.C.3.2.1. The Modes of Operation: Triggers and Scanners
4.C.3.2.2. Centre and Whole

Introduction to Section 4.C

The need to assemble knowledge of our world into one cohesive view derives from the necessity to take it apart in order to penetrate it in depth. As Ackoff et al. (1972 , p. 4) have mentioned the task of synthesis assumed by some philosophers and scientists derives from the confusion of taking the results of disciplinary analysis as the starting points of experience, rather than taking conceptual analysis of holistic experience as the starting point of scientific disciplinary analysis.

In fact the author would like to mention that we need to take a cohesive view of human behaviour and hence necessarily a functional, teleological, or purposeful view. Or we need to make all the functional concepts employed as objective, as measurable, as capable of use in experimentation as any structural concepts produced by mechanistic (so- called behaviouristic) view of human behaviour. An objective teleology expressed in the form of a conceptual system can serve as a foundation for significant research into such phenomena as choice, communication, and other types of social interaction. Thus, to improve communication processes we must understand why individuals choose to communicate in the way they do. **We cannot start our analysis with the message they have produced; we must begin with the process by which messages are produced. This is a matter of choice. Choice must be an integral part of any complete model of communication.**

Quoting Ackoff et al. (1972) from previous section the process of pursuing purposes or choice involves not only obtaining information about and from the environment (which may include other purposeful systems) but also communicating with oneself in thought. **Thinking is an operation on concepts, images, and signs of these. It involves the manipulation of signs and presupposes at least a private language. It means meanings are contained in beliefs about consequences of courses of action that can be taken, and they are expressible in sign complexes that are statements.** Therefore, not only do we have to understand choice to understand communication, but we also need to understand communication in order to understand choice (p.134).

One of the most important properties of the environment of a purposeful individual or

system is whether or not it contains one or more other purposeful systems. Up to this point it was already defined what it means for a purposeful system to sense, perceive, and observe its environment. It is now necessary to examine what is meant by mutual sensing, perceiving, and observing between systems that are capable of at least partially controlling what sensation, perception, and observations the other system has. Moreover, by their choices interacting systems can create a social field that is different from and potentially more complex than what either one can separately produce. It has been stated:

> "The prerequisite for interaction between purposeful systems is that they can sense, perceive, observe, and remember the same sorts of things in their shared environment. The minimal level of intersystem behaviour - that is, where there is an intent to produce a behaviour in the other - is communication" (Ibid., p. 139).

Thus, the major concern of this section is: first, how do we obtain *information* or the term 'communication'; second, how do we make transmissible information, or the term 'the structure of thought'; and third, how do we examine the structure of thought across space and time, or the term 'function'. The major plan is hence to open up the debate about the nature of the transformation of the structure of thought across space and time which it is itself open-ended and not pre-programmed. As, therefore, 'function' is the subject of the study of social practices ordered across space and time, the outcome would suggest the inquiry of the process of space over time. The principal issue with which the next section will be concerned is, therefore, connecting the notion of human action with structural explanation in socio-spatial analysis.

4.C.1. Obtaining *Information* - Communication

In an environment shared by two purposeful individuals or systems, each may be unaware of the presence of the other. However, if one has a feeling about the other it must be aware of their overlapping environments. In these situations the **interactions** of the individuals or systems can produce intersystem behaviour. **It is possible for one system to affect the other's parameters of choice without changing either its environment or the**

components of its choice situation. ***Communication* is such a way**. Furthermore, through communication one system can affect the behaviour of another in a completely different environment. In other words: "One purposeful individual *(B)* communicates to another *(A)* when a message produced by *B* produces a change in one or more of the parameters of *A*'s purposeful state. *B* can be referred to as the *sender* and *A* as the *receiver*" (Ibid., p. 142).

4.C.1.1. The Nature of Communication

Several aspects of this definition of communication should be noted: first, sender and receiver may be the same individual; that is, a person may communicate to himself/herself, as in writing a reminder to himself/herself. Second, the sender of the message need not intend or want to communicate to the receiver in order to do so. An interceptor of a message may be communicated to, although unintentionally. Third, the sender and receiver may be widely separated in time and space. Through their writings both Aristotle and Nehru have communicated to, though not with, us. And finally, **we should note that *both parties in communication must be purposeful*.** If we push a button to start a machine and the machine has no choice, communication has not taken place. On the other hand, if we push a button at the front door of a house, though we do not communicate with the bell we do communicate with the occupants of the house; both they and we have alternative ways of pursuing our objectives (Ibid.).

In terms of modes of communication a particular communication may change the receiver's probabilities of choice, the efficiencies of his choice, the relative value of the possible outcomes, or some combination of these. Even where a communication produces a combination of changes in the receiver, each type of change can be studied separately. Each of the three types of change produced by a message can be identified and defined as follows:

4.C.1.1.1. Information (Changes in Probabilities of Choice)

As Ackoff et al. state "**a communication that produces a change in any of the receiver's probabilities of choice *informs* him, and hence transmits 'information'**" (p. 144). But, in this relation Shannon et al. (1949) were concerned with what may better be called the *amount of message* transmitted rather than with the amount of information communicated.

He was primarily involved with systems in which each possible message can be coded into a combination of two symbols. For example, if there are four possible messages and two symbols (0 and 1), the messages can be represented as 00, 01, 10, 11. Then to select one message out of the four, two choices from among the two symbols (that is, binary choices) may be made. One binary choice allows two messages (0 and 1), and three binary choices allow eight messages (000, 001, 010, 100, 110, 101, 011, and 111).

For Shannon, the amount of information contained in a message is the amount of freedom of choice involved in the selection of the message. A unit of choice is defined as the selection of one out of two equally available symbols. Thus, in selecting one of two equally available symbols, one choice unit is involved and the resulting one-symbol message contains one unit of information.

In Shannon's use of information we cannot speak of how much information a person has, only how much a message has. Clearly, from the behavioral scientists' point of view, the person is much more important [Attempts to use Shannon's theory of communication in the behavioral sciences has hardly met with success. See Hardy and Kurtz (1963) for an evaluation of these efforts. Also see Schramm (1966), who observed, "... we must admit frankly the difficulty of bridging the gap between the formula's concept of information (which is concerned only with the number of binary choices necessary to specify an event in a system) and our concept of information in human communication..." (p. 534)].

It is therefore important to observe that the measures of information developed by Shannon et al. contain no implication concerning the correctness or incorrectness of the information received. Further, it should be noted that this measure is relative to a specific state. **The same message may convey different amounts of information to different individuals in the same choice environment or to the same individual in different choice environments**. It should also be noted that messages are not the only possible source of information; one may also obtain information by perception. The measures of instruction and motivation are also applicable to perception. Therefore as mentioned by Ackoff, et al. (1972):

> "... a message that informs either (1) changes the subject's conception of the choice situation (what choices he believes are possible) and, through such changes, modifies his beliefs in the efficiencies of the alternatives that he perceives; or (2) changes his beliefs in efficiencies without changing his beliefs about available choices" (p. 153).

4.C.1.1.2. Instruction (Changes in Efficiency of Choice)

But, "**a communication that produces a change in the efficiencies of any of a receiver's courses of action *instructs* him, and hence transmits 'instruction'**" (Ibid., p. 144). In a sense, to inform is to provide a basis for choice - that is, a belief in the greater efficiency of one choice compared to another. **It means information modifies objective probabilities of 'choice' by modifying believed** (subjective) **probabilities of success whereas instruction is concerned with modification of the objective probabilities of 'success'** or **'efficiency'**: "The amount of **'instruction'** a subject has in a particular state is equivalent to the amount of **'control'** he can exert over possible outcomes in that state. He has maximum control if he is capable of bringing about any of the possible outcomes by any of the means available to him. To instruct is to impart such a capability where it is lacking" (Ibid., p. 153).

4.C.1.1.3. Motivation (Changes in Values)

Therefore "**a communication that produces a change in any of the relative values the receiver places on possible outcomes of his choice *motivates* him, and hence transmits 'motivation'**" (Ibid., p. 144). It means if an individual equally values all possible outcomes in a purposeful state, then he has no basis for selecting one from among them to pursue. He can be said to be **'unmotivated'** in that state. It should be recalled that the outcomes used to define a purposeful state are defined so as to be exclusive and exhaustive. As Ackoff et al. (1972) have concluded:

> "As courses of action and outcomes (means and ends) are relative concepts, by reconceptualizing a subject's purposeful state, an investigator can convert courses of action into outcomes, or outcomes into courses of action. Therefore, by using such transformations it is possible to convert what appears as information in one formulation of another's purposeful state into motivation in another formulation, or,

conversely, to convert motivation into information... since instruction and information also could be converted into each other, it follows that each of the three measures has a transformation into each of the others" (p. 156).

4.C.1.2. Signs, and Symbols

The definition of communication given before used the concept message. Since a message consists of one or more signs, it is first necessary to define sign. Using these concepts, message is then defined. The task of analysing the meaning of sign can be divided into two questions: 'What can be called signs?' and 'By virtue of what properties can they be called signs?'

According to Ackoff et al. (1972) objects can be signs - billboards, posters, and in general, those physical objects we commonly call signs. But behaviour patterns can also be signs - such as gestures and speech. Sometimes it is fruitful to consider the properties of objects and behaviour as signs rather than objects and behaviour themselves. A red light is frequently a sign of danger, but we do not respond to all the properties of the object that throws the light. We may not respond to the material the lamp is made of, but we do respond to its redness and location: "The distinction among objects, behaviour, and their properties is only a matter of emphasis, since only objects or events (including behaviour) have properties; hence a response to a property is also always a response to what has the property. It will be important, however, to identify the properties of an object or even that make it serve as a sign" (p. 160).

In this relation Morris (1964) defined, a sign produces a disposition to respond: "... a disposition to react in a certain way because of the sign (food seeking behaviour in the case of bees), has no necessarily 'subjective' connotation. Such a disposition can, if one wishes, be interpreted in probabilistic terms, as the probability of reacting in a certain way under certain conditions because of the appearance of the sign" (p. 3). It means, for Morris, a sign produces a potentiality for response. Ackoff et al. prefer, however, to place the potentiality in the sign rather than in the respondent, because, for Morris, an X is a sign only if it produces a disposition to respond; when it does not, it is not a sign. But, to Ackoff et al. it seems that X should be a sign if it **can** produce the required type of response, even though it may not be

doing so in a particular situation. They define sign as: "... **anything that is a potential producer of a response to something other than itself**." And hence signification of a sign as: "... **something other than the sign that the sign potentially produces a response to**[1]" (1972, p. 161).

But, about symbols, according to Suzanne Langer (1948), "**a symbol is a sign that signifies a concept**." This is certainly one way that symbol is commonly used. Symbols, in this sense, are frequently, but not necessarily, natural or nonlinguistic sign. To quote Langer: "**Instead of announcers of things, they [symbols] are reminders**. They have been called 'substitute signs', for in our present experience they take the place of things we have perceived in the past, over even things that we can merely imagine by combining memories, things that *might* be in the past and present experience" (p. 24). Therefore: "... it is the conceptions, not the things, that symbols directly mean" (p. 49).

Symbol is also commonly used in another sense, particularly in logic and mathematics, but also in more common place activities. For example, +, =, and so on. In what sense is + different from *plus*? It is this sense of symbol that Morris (1946) used when he defined **a symbol as a sign of a sign** "that is produced by its interpreter and that acts as a substitute for some other sign with which it is synonymous" (p. 355). Hence, for Morris, a symbol is a sign of another sign that is produced by the same person who responds to it: "Where an organism provides itself with a sign which is a substitute in the control of its behaviour for another sign, signifying what the sign for which it is a substitute signifies, then this sign is a *symbol*..." (Ibid., p. 25).

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[1] Therefore, the secondary stimulus to which a sign produces a response (what is signifies) can be considered in following two ways - denotatively and connotatively:

1) "**Denotation of a sign**: **the set of objects or events signified by a sign**. The denotation of a sign may range from particular to general, may change with circumstances, and vary for different individuals. The statement, 'the television program I watched last,' may denote different programs to different persons at the same time and to same person at different times.

2) **Connotation of a sign**: **the set of properties** (of the objects or events responded to) **that produces the response**. The connotation of a sign may also change with circumstances and vary for different individuals. The statement 'the last television I watched,' may connate different properties (such as humour, drama, news) to different people and to the same person at different times" (Ackoff et al., 1972, p. 164).

But, for Ackoff et al. (1972) it does not seem that a sign can serve as a symbol only to the one who produced it. Somehow, in a writen equation + is as much a symbol to the reader as one the reader writes himself. Nevertheless, it is clear that *symbol* is used in the sense of a substitute for other signs. Therefore, for Ackoff et al. symbol is not only used as a sign of a concept [as Langer defined]; or as a sign of a sign [as Morris explained], but it is also used as a sign of an image (as caricatures are frequently used symbolically). For them, **symbol seems to be used as a sign of an image, concept, or another sign**. Therefore, images, concepts, and signs all have a common property[2]: "each represents something other than itself; that is, they can produce responses to something other than themselves." This suggests a definition of symbol that synthesizes at least several of its common uses: "... **a sign that is a potential producer of a response to something, which in turn is a potential producer of a response to something other than itself** " (p. 168).

4.C.1.3. Meanings, and Messagges

As we noted before the meaning of a term does not lie in what it comes from, but in what it leads to; or, in another words, in the difference it makes in the respondent's behaviour. A sign that does not affect behaviour has no meaning, no matter what it signifies. Thus the meaning of a sign lies in what can make one do. When one cries *Fire!* in a crowded theatre, the meaning of the cry is not to be found in the flames denoted or the heat connoted but in the effort to escape harm or avoid destruction that it produces. In effect, meaning, though a function of what a sign signifies, is separate from it; it lies not in the signification of a sign but in its *significance*. Furthermore, meaning is not only applicable to signs but also to any experience or thing that is experienced. All things that act as signs have meaning, but not every thing with meaning is a sign[3]. Meaning is not captured in definitions, signification is (Ibid., p. 170).

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[2] For more information about images and concepts see Chapter (1) on descriptive images and explanatory concepts.

[3] One asks of an event, 'What does it mean?' This is equivalent to asking, 'What will it lead to?' or 'What significance does it have?' When one is asked what television means to him, he is likely to refer to entertainment, keeping informed about world affairs, and perhaps even education. He does not define television but reveals its significance to him.

Cherry (1957) observes that 'the meaning of the utterance to the listener, B,' is the selection of the particular response he actually makes, and that, 'the meaning of the utterance to the speaker, A' is the selection of a response in B that A intends his utterance to evoke (p. 114). This concept of meaning is also presented by Ogden and Richards (1947), and much earlier by Gardiner (1921, p. 22). **Meaning, therefore, is a property of a purposeful response to a stimulus. It is quite naturally attributed to the stimulus because the stimulus produces it**: "**The meaning of a stimulus** (sign or otherwise) **is the set of functional properties of the response it produces**" (Ackoff et al., p. 170).

Thus, a sign may have different meanings for different individuals, or different meanings for the same individual at different times. 'No rain expected today' may mean one thing to a farmer at work but another when he is vacationing. Its meaning may also change with the seasons[4].

But, about messages, since individual signs seldom function independently of other signs it seems more fruitful to discuss the properties of sign combinations - that is, messages. The signification and meaning of a message is never the simple sum of these properties of the component signs; it is a resultant of a considerable interaction between the individual sign properties. Consider the difficulty of translating a message in an unfamiliar language with the

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[4] Since the functional properties of different responses to the same sign may differ, the only meaning that *the meaning* of a sign can have lies in a common functional property of these different responses. That is, we may find a more general function that persists among responses that are functionally different at a lower level of generality. Morris (1964) discusses three types of signification (semantic properties) of signs and three corresponding 'disposition to react in a certain way' (pragmatic properties). Semantically speaking, a sign is:

> "**Designative**, 'insofaras as it signifies *observable* properties of the environment or the actor' (as black);
> **Prescriptive**, 'insofar as it signifies how the object or situation is to be reacted to so as to satisfy the governing impulse' (as ought); and
> **Appraisive**, 'insofar as it signifies the consummatory properties of some object or situation' (as good)" (p. 4).
> And the corresponding (pragmatic) functions are to produce:
> "a disposition to react to the designated object as if it had certain observable properties;
> a disposition to act in a certain kind of way to the designated object or situation; and/or
> a disposition to act toward a designated object as if it would be satisfying or unsatisfying" (p. 6).

There is a considerable correspondence between these three functions that Morris identifies and the three Ackoff et al. have discussed: (1) *information*, (2) *instruction*, and (3) *motivation*. It is apparent that signs designative in Morris's sense, inform in their sense; those prescriptive, instruct; those that appraise, motivate.

help only of a dictionary. The signification and significance of a sign depend on the sign environment and the situation in which it is used. This is why a dictionary must give so many different definitions of most signs. It is, therefore, stated by Ackoff et al. (1972) **a message** as "**a set of one or more signs intended by its producer to produce a response either in another or in himself** " (p. 176).

One can, of course, send a message to oneself; such as a reminder entered on a calendar. Furthermore, a message can be sent without the use of words, by gestures. However, messages are normally formed out of linguistic signs. It is necessary, therefore, to understand the nature of language if one wants to fully understand the nature of messages.

4.C.2. Making Transmissible *Information* - The Structure of Thought

So far we noticed that thinking is an operation on concepts, images, and signs of these (i.e. symbols) which involves the manipulation of signs. Meanings are contained in beliefs about consequences of courses of action that can be taken, and they are expressible in sign complexes that are statements (i.e. messages).

It means, to inform is to provide a basis for choice. But we noticed that objects can be signs - billboards, posters, and in general, those physical objects we commonly call signs. Or sometimes, behaviour patterns can also be signs - such as gestures and speech. So **a sign is a combination of functional properties of objects or events that explains a particular phenomenon of communication**. From the other hand, symbol seemed to be used as a sign of an image, concept, or another sign. This suggested a definition of symbol as a sign that is a potential producer of a response to something, which in turn is a potential producer of a response to something other than itself.

Now the main point is that to form a **language** there must be more than a set of signs (i.e. a message). The linguistic entity only exists through the association of the signifier and signified. Succession of sounds is linguistic only if it supports an **idea**. Language does not offer itself as a set of pre-delimited signs that need only be studied according to their meaning and arrangement. The elements which de Saussure (1966) proposes are, basically, **'relationship'**.

He proposes an abstraction as the 'unit' and a formal structure as the source of 'systemness'. This formal structure in language is the major concern of the study in this section - the process of thought.

4.C.2.1. Language

According to Ackoff et al. (1972) **to form a language there must be more than a set of signs; there must also be a set of rules** [relations - author's emphasis] **for combining signs into groups in such a way that the resulting sign complexes have the same properties required of linguistic signs**. These rules specify the form that linguistic expressions should take and how the resulting expressions should be interpreted: "**Language is a set of signs as well as instructions for their use** such that (1) the signs can be produced by purposeful individuals, (2) the signs are semantically and pragmatically efficient for a significant portion of those who use them, (3) the signs are environmentally and socially general in the semantic and pragmatic sense, and (4) the instructions signify ways of permuting and combining signs in the set to form sign complexes that also satisfy conditions (2) and (4)" (Ibid., p. 117).

In experimental conflict situations, it is argued that when communication between participants is prevented it has been observed that the participants attempt by their actions alone to make their intentions known to, and influence, the others. People tend to cooperate more when they can communicate with each other than they cannot. An even stronger observation has been made: even when communication is possible but is not used, people tend to cooperate more than when it is prohibited (These and related findings were reported in Management Science Centre, 1967). This indicates that the mere possibility of communication tends to reduce the hostility between conflicting parties. In the experimental work in this area, communication has had a greater positive effect on cooperativeness than any of numerous other variables tested (Ibid., p. 206).

4.C.2.1.1. The Laws of Language

In fact, Ackoff's statement about language reminds us the definition of group by Hillier's et al. (1972) who explain "a group as a set of elements together with a rule of combination or operation, subject to certain rules" (p. 67). One of the examples they use is that the set of

natural numbers, together with the operation of addition, constitute a group provided they fulfil certain conditions: *(a)* performed on elements of the set the operations yields only set elements; *(b)* a neuter or identity element ('0') exists which when combined with another by the operation leaves it unaffected; *(c)* the operation has an inverse (e.g. '-'), such that in combination with the operation itself the identity element is given (+ n - n = 0); *(d)* the operation and its inverse are 'associative' (n + m) + i = n + (m + i) (Ibid.). Therefore, as a conclusion by them:

> "First, the concept of group is itself a mathematical version of the concept of **invariance under transformation**; the group is capable of producing new configuration by the application of its rule. In other hands, the group is capable of yielding a large number of transformations of itself. In fact, a group may be thought of as a sub-group of a system of transformations, which are all based on the same structure. Second, the group possesses two properties which are of interest to the notion of self-regulation; on the one hand, **a return to the starting point is always possible**, that is, it is **'reversible'**, on the other hand, **the same terminal state can be arrived at by different routes**. These two add up to a kind of formalisation of self-regulation of a reversible system" (p. 68).

But, from the other hand, the thermodynamics which is a science of irreversible physical process, and the idea of history as an irreversible process (new historical theories of society), and the theory of evolution which opened up the dimension of time in the biological science (with the effect of changing the whole world picture), have all participated in the pervasive concern for the **irreversible processes**. And, this is in the same concern that Levi Strauss (1969) has extended the analogy to society itself. **He has contrasts the societies studied by anthropologists, which resembles clocks in that they do not have irreversible 'history', with modern 'historical' societies which, like steam engines work on *disequilibrium and differential energy* and in which change, as a result, tends to be *irreversible***.

Therefore, the **structure** that Chomsky (1971) also proposes in language is not simply a convention defined for the scientist's purposes from outside the system: "It is an attempt to

make a model of those structures that must already exist within a language in order for it to be possible for that language to be used in a **rule-governed creative way**" (p. 50). In effect, Chomsky's notion of language is as the same as Ackoff's latter statement - conditions (2) and (4). To quote, hence, Hillier et al. (1972):

> "A **model** refers to a **structure of entities and operations** in some domain for which a **legitimate string of symbols** holds good. In other words, **beginning with a 'sign model' a search may be conducted to find a 'model' in some domain of objects other than those symbols**. In particular it draws attention to a fundamental aspect of modern science: that it proceeds by a **dialectic between its empirical orientations and its language**." [author's emphasis]

In difference between sign and symbol it has been mentioned by George (1979) that: "Black clouds are a sign of rain and 'rain' is a symbol for rain, and certainly it is true that in describing rain it is only a sign for me by theory of meaning circular as some have argued, since we would argue in turn that symbols are signs and signify (albeit by convention)" (P. 86). And, of course, meaning in a close relationship to different individual, different times and different situation may differ very vastly.

In a sense, Chomsky (1971) uses the concept of **transformation** to account for the transition from **'meaning'** to **'verbal production'**, from **deep** to **surface** structure. Grammar is **a set of recursive transformation rules**, which are 'known' in that they can be correctly and generatively used and understood [a convention defined for the scientist's purposes from outside the system - Chomsky's emphasis], but from a formal point of view they are unknown. To quote Hillier et al. (1971): "The most resilient achievement of this theory is to have shown how, formally, **the logical structure of language is not in contrast to its open-ended and creative use**" (p. 69) - Chomsky's phrase of a **'rule-governed creativity'**.

4.C.2.1.2. The Laws of Thought

The work of George Boole (1854), one of the seminal figures of nineteenth-century thought, is concerned with language. His work is concerned to show that **language**, **with all its**

variability, expresses certain underlying structural laws of thought. "Nor could we easily conceive that the unnumbered tongues and dialects of the earth should have preserved through a long succession of ages so much that is common and universal were we not assured of the existence of some deep foundation of their agreement in the laws of the mind itself" (p. 25).

Boole sees language as a device for carrying out reasoning. That the underlying structures of language are isomorphic with reasoning activities in spite of the apparent surface variation of language. As he expresses: "**In studying the laws of signs we are in effect studying the manifested laws of reasoning**" (Ibid.). **The structure of language, therefore, emerges from the subject and constitutes the externalisation of the structure of the subject's thought**. Hillier et al. (1972) further state:

> "**The 'calculus' of symbols is not fixed in relation to the world it describes, as it was then it was intended to support a fixed system of taxonomic knowledge**. Instead, **it is an 'instrument of reasoning' - that is a methodology of discovery as well as a purified system of signs**... this offers a new interpretation of the epistemology of language, namely that language already possesses certain underlying structural laws, which are isomorphic to 'reasoning'..." (p. 55).

4.C.2.1.3. 'Systemness' in Meaning and 'Elements' in System - The Relationship

De Saussure (1966) first concerns that in all systems of signification the existence of any single value, of a coin, for example, depends on the simultaneous existence of a number of other values to which it relates, and also to another equally systemic but different set of entities to which it can also be systemically referred. He says: "Let us observe that even outside language all values are apparently governed by the same paradoxical principles. They are always composed (1) of a dissimilar thing that can be exchanged for the thing of which the value is to be determined; and (2) of similar things which can be compared to the things of which the value is to be determined. To determine what a 5-franc piece is worth one must first know (1) that it can be exchanged for a fixed quantity of a different thing, e.g. bread; and also (2) that it can be compared with a similar thing in the same system... its content is only fixed

by the concurrence of everything that exist outside. Being part of a system, it is endowed not only with signification but also with a value which is something quite different" (p. 113).

This is the model for understanding how de Saussure handles the problem of 'systemness' in meaning. It formulates the dependence of the part on the whole in a way that is not in at least mysterious. But, the second point of de Saussure's concern is the problem of 'elements' in systems. It has already been shown from the above that 'elements' are interdependent in an important way, to the extent that they only have meaning by virtue of their membership of a total system. De Saussure goes further and denies the existence of concrete 'elements' in language or any other system of signification. This may be more than a little surprising, since words obviously do exist and appear to be concrete enough. But, argues de Saussure, this is deceptive:

> "**The linguistic entity only exists through the association of the signifier and signified**. Whenever only one element is retained, the entity vanishes; **instead of a concrete entity we are faced with a mere abstraction**... **succession of sounds is linguistic only if it supports an idea**... hydrogen and oxygen, taken separately neither has any of the properties of water.... To summarise: **language does not offer itself as a set of pre-delimited signs that need only be studied according to their meaning and arrangement**" (p. 102).

De Saussure continues: "When a science has no concrete units that are immediately recognisable it is because they are not necessary. In history, for example, is the unit the individual, the era, or the nation? We do not know. But what does it matter? We can study history without knowing the answer.... But just as a game of chess is entirely in the combination of the different chess pieces, language is characterised as a system based on entirely on the opposition of its concrete units.... Language has the strange, striking characteristic of not having entities that are perceptible at the outset and yet of not permitting us to doubt that they exist and their functioning constitutes it" (p. 105). To quote Hillier et al., the 'elements' of a de Saussurian system are, basically, **'relationships'**. They explain:

> "This formulation is very far indeed from the concept of system given in general system theory. In fact, it negates it in all points. In 'systems' elements are visible, accessible, defined and their combination in relations gives the 'system' as a whole. De Saussure is proposing **an abstraction as the 'unit' and a formal structure as the source of systemness**. This formulation easily contains **the existence of higher-order properties for the system as a whole which do not emerge from the interaction of the elements**" (p. 58).

Since 'meaning' depends on the underlying structures which unify the whole, that particular relations - particular elements and particular realisations - depend on the whole structure of meaning for their intelligibility. The structure that permits meaning to exist also makes it interdependent with the total meaning structure of that system.

4.C.2.1.4. Synchronic Systems and the Diachronic Process

De Saussure (1966) also explains that **diachronic development** is not the only process to be taken notice of in the study of a language, and that in fact the history of a word may give a seriously inadequate account of its meaning. As Piaget (1971) reveals de Saussure's words: "In addition to its historical aspect language has a 'systematic' aspect; it embodies laws of equilibrium which operate on its elements and which, at any given point in its history, yield a synchronic system. Since the basic relation in language is that between the sign and its meaning, and since meanings are relative to one another, the system is one of oppositions and differences; while it is synchronic because the meaning-relations are interdependent" (p. 76). De Saussure (1966) himself states: "... **diachronic linguistics studies is not relations between coexisting terms of a language-state but relations between successive terms that are substituted for each other on time**" (p. 140). Therefore:

> "Synchronic linguistics will be concerned with the logical and psychological relations that bind together **coexisting terms** and form **a system in the collective minds of speakers**. Diachronic linguistics, on the contrary, will study relations that bind together **successive terms** not perceived by the collective mind but **substituted for each other without forming a system**" (p. 99). [author's emphasis]

It introduces the relation between synchronic systems and the diachronic process in linguistics domain: to where structure belongs, not to **the means of expression**, but to **the expressed**, to **the signified** rather than to **the signifier**, in short, **to realities which have intrinsic value and normative power**. The defining character of norms is that they are obligatory, that they conserve their own value by binding men to such conservation. *Their* equilibrium at any given time depends upon their antecedent history, for the distinctive character of development here is that it is always directed toward such equilibrium. To quote Piaget (1971): "The **history** or rather **chronicle of a word**, however, may simply consist of **a series of changes of meaning** without **any mutual relations** except such as result from the necessity of answering to the expressive requirements of the successive synchronic systems to which the word belongs. **Normative and conventional structures** are, therefore, at opposite poles as regards **the relations between synchronics and diachronics**" (p. 79). [author's emphasis]

4.C.2.1.5. Individuals and the Group

It is also mentioned by Piaget (1971) that "language is a group institution. Its rules are imposed on individuals" (p. 74). That "the syntax and semantics of a language yield a set of rules to which any individual speaking that language must submit, not only when he wants to express his thought to others, but even when he expresses it 'internally'" (p.75). In short:

> "**Language is independent of the decisions of individuals**; it is the bearer of multi-millennial traditions; and it is every man's indispensable instrument of thought. As such, it appears to be **a privileged domain of human reality**, so it is only natural that it should sometimes be regarded as **the source of structures** which, on account of their age, generality, and power, are of special significance" (Ibid.).

4.C.3. Examining the Structure of Thought across Space and Time - The Function

By the definition of structure, *all* the social sciences yield structuralist theories since, however different they may be, they are all concerned with group and individuals, that is, with self-regulating transformational totalities. A social group is evidently a whole; being dynamic, it

is the seat of transformations; and since one of the basic facts about such groups is that they impose all sorts of constraints and norms (rules), they are self-regulating.

But Piaget (1971) mentions that there are at least two important differences between this sort of **'global'** structuralism and the deliberate **'analytic'** structuralism. "First, where the former speaks of 'emergence', the latter speaks of 'laws of composition'" (p. 98). It means, the first thought treats totality as a primary concept explanatory as such; the social whole arises of itself from the union of components; it 'emerges'. But, the second thought has more emphasize on the details of transformational interactions. "Second, whereas 'global' structuralism holds to systems of observable relations and interactions, which are regarded as sufficient to themselves, the analytic structuralism is that it seeks to explain such empirical systems by postulating 'deep' structures from which the former are in some manner derivable" (Ibid.).

Here, the study considers the work of Talcott Parsons (1960), whose 'structral-functional' methos brings us back again to the question of the relation of structure and function. For him, **structure and function together belong, accordingly, to a 'total system' that is conserved by 'regulations'**, and the problem that has chiefly occupied him is to explain **how individuals come to integrate communal values**. This is where his theory of **'social action'** comes in, which analyzes **the various alternative courses of action open to the individual in terms of whether or not he submits to the collective values**. As Piaget (1971) states:

> "In the social context, structures, no matter how 'unconscious', express themselves sooner or later in the form of **'norms'** or **'rules'** to which individuals are, to a greater or lesser extent, **subject**. Now, however convinced one may be of the permanence of structures themselves, **the *rules* generated by them can nevertheless change their function**, as is shown by changes of value; *values* do not, of themselves, have 'structure', except precisely to the extent that certain forms of value, such as moral value, are based on *norms*. **Value seems, then, to point up a distinct dimension, the dimension of function**; thus, **the duality and re-established interdependence of value and norm seem to testify to the necessity of distinguishing and connecting structure and function**" (p. 103). [author's emphasis]

4.C.3.1. The Laws of Society

Suffice it to highlight what is the fundamental principle of Levi-Strauss structuralism - the thought that "all social life, however elementary, presupposes an intellectual activity in man of which the formal properties cannot, accordingly, be a reflection of the concrete organization of society (1963, p. 96)[5]." He notes at length that behind the **'concrete' social relations** there is always **'conceptual structure'**, unconscious, no doubt, and therefore **discoverable only by elaborating abstract structural models, but nonetheless formative** (Ibid.). From this perspective, therefore, there is no longer any need to choose between the primacy of the social or that of the intellect: "... **the collective intellect is the social equilibrium resulting from the interplay of the operations that enter into all cooperation**. Nor does intelligence precede mental life or the reverse; it is the equilibrated form of all cognitive functions" (Piaget, 1971, p. 114).

But what, then, becomes of that unchanging human mind whose constancy Levi-Strauss himself defends by appealing to the permanence of the **'symbolic function'**? Piaget has stated: "We must admit that we do not really understand why the mind is more truly honoured when turned into a collection of permanent schemata than when it is viewed as yet unfinished product of continual self-construction." The study proposes its idea that it is also because of **transferring more useful and abstract information to continue the way towards the ideal intellect**. *Must*, therefore, the 'symbolic function' be thought of as permanent? Would it not be legitimate to think of what de Saussure called the 'sign' as having evolved from what he called the 'symbol'[6]? Is not this which Levi-Strauss cites with approval as correctly assigning a fundamental role to figurative language (1963, p. 102)? And when he speaks of metaphor as constituting a 'first' or 'primary' form of **discursive thought**, must we not take this to mean that there is something to follow after, or at least that there are 'levels'? Granting

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[5] Levi-Strauss, 1963, *Totemism*, Translated into English by Rodney Needham, Boston, Beacon Press.

[6] De Saussure differentiates the *index* (causally connected with what it signifies) from the *symbol* ('motivated') on the one hand and the *sign* ('arbitrary') on the other; the sign is necessarily social, because conventional, whereas the symbol may be, as in dreams, individual (Piaget, 1971, p. 115).

that 'thought untamed'[7] is always present among us, does it not nevertheless constitute a level of thought inferior to the scientific? Levels in a hierarchy imply stages of formation.

Unquestionably, the kinship systems bear witness to a much more advanced logic. But these, as need hardly be mentioned and is perfectly obvious to the ethnographer, are not the products of individual invention; it is long-term collective elaboration that has made them possible. They depend, therefore, as do linguistic structures, whose power likewise surpasses the resources of individuals, on institutions (Piaget, 1971, p. 117). If the concept of self-regulation or equilibrium has any sense at all, the logic or pre-logic of the members of a given society cannot be adequately gauged by already crystallized cultural products; the real problem is to make out how the ensemble of these collective instruments is utilized in the everyday reasoning of each individual. As Piaget states:

> "Whereas other animals cannot alter themselves except by changing their species, man can transform himself by transforming the world and can structure himself by constructing structures; and these structures are his own, for they are not eternally predestined either from within or from without. So then, **the history of intelligence is not simply an 'inventory of elements'; it is a bundle of transformations, not to be confused with the transformations of culture or those of symbolic activity, but antedating and giving rise to both of these**" (Ibid., pp. 118-9).

Granting that reason does not evolve without reason, that it develops by virtue of internal necessities which impose themselves in the course of its interactions with the external environment, nevertheless reason has evolved, from the level of the animal or the infant to the structural anthropology of Levi-Strauss himself. He noted: "Language, an unreflecting totalization, is human reason, which has its reason and of which man knows nothing" (1967, p. 252). **The study hypothesizes that one of the necessities of creation of language or any other symbolic entity is actually for transferring more useful and abstract information**

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[7] See Levi-Strauss, 1967, *The Savage Mind*, p. 219: "... Comte assigns this 'savage mind' to a period of history... while in this book it is neither the mind of savages nor that of primitive or archaic humanity, but rather mind in its untamed state as distinct from mind cultivated or domesticated for the purpose of yielding a return."

to get man closer to his ultimate ideals. To qoute Piaget (1971, p. 128), therefore, Gidelier's (1966) final conclusion is worth citing in full, because it summarizes the leading ideas of the study as a whole.

> "Anthropology could no longer challenge history, nor history anthropology; the opposition between psychology and sociology, sociology and history, would become sterile. **For the possibility of a 'science' of man would, in the final analysis, depend upon the possibility of discovering the laws governing the operation, evolution, and internal relations of social structures... the method of structural analysis will, in other words, have to be generalized so as to become capable of explaining the conditions of variation and evolution of structures and their functions**" (Godelier, *Les Temps modernes*, 1966, p. 864).

For a structuralism of this sort, *structure and function, genesis and history, individual subject and society* are - once the instruments of analysis have been refined - inseparable, the more so the more it perfects its analytic tools (Ibid.). **It does not mean at all that 'structures' have been the death of the *subject* or its activities, but, conversly**: "**In the first place, it is called for a differentiation between the *individual subject*, who does not enter at all, and the *epistemic subject*, that *cognitive nucleus* which is common to all subjects at the same level. In the second place, the always fragmentary and frequently distorting grasp of consciousness must be set apart from the achievements of the subject; what he knows is the *outcome* of his intellectual activity, not its mechanisms**" (p. 139). **The study hence does emphasize on consciousness purposeful ideal-seeking process of mind which leads all epistemic subjects, in a whole individually and as a whole with each other, to the outcome - the stucture**. Therefore, there remains subjects' operations which are drawn out from general coordination of activities by reflective abstraction. These are, therefore, operations which constitute the elements of the structure that all epistemic subjects employ in their ongoing intellectual activity.

It might seem that the foregoing account makes the *subject* disappear to leave only the 'impersonal and general', but Piaget concludes: "... this is to forget that on the plane of

knowledge (as, perhaps, on that of moral and aesthetic values) the subject's activity calls for a continual 'de-centring' without which he cannot become free from his spontaneous intellectual egocentricity. This 'de-centring' makes the subject enter upon, not so much as already available and therefore external universality, as an uninterrupted process of coordinating and setting in reciprocal relations. It is the latter process which is the true 'generator' of structures as constantly under construction and reconstruction. **The subject exists because**, to put it very briefly, **the being of structures consists in their coming to be, that is, their being 'under construction'**" (Ibid., pp. 139-40).

It is in fact a continual inductive process of all individual activities to construct the model of more useful transmissible informatiom which takes place with deferent relations in space and time dimensions - the structure - towards the ideal and ultimate perfection. The justification for this last assertion is furnished by the following conclusion: **There is no structure apart from construction**, either genetic or abstract. **The subject cannot, therefore, be the *a priori* underpinning of a finished posterior structure; rather, it is *a centre* of activity**.

4.C.3.2. Abstract Systems and Concrete Systems

To concentrate more on the inductive process of making relational systems it is useful to quote Ackoff et al. (1972) who write about systems: "**A system** is an entity composed of at least two elements and a relation that holds between each of its elements and at least one other element in the set. The elements form a completely connected set that is not decomposable into unrelated subsets" (P. 18). Therefore, **although a system may itself be part of a larger system it cannot be decomposed into independent subsystems**. About abstract systems they also state: "**An abstract system** is one all of whose elements are concepts. Languages, philosophic systems, and number systems are examples of abstract systems. Numbers are concepts, but the symbols that represent them, numerals, are physical things. Numerals, however, are not elements of a number system. The use of different numerals to represent the same numbers does not change the nature of the system" (Ibid.).

In an abstract system, therefore, **the elements are created by defining** and **the relationships**

between them are created by assumptions (e.g., axioms and postulates). Such systems, therefore, are the subject of study of the so-called 'formal science' (Ackoff, Management Science, 1971, p. 662). But, from other hand, **a concrete system** is one at least two of whose elements are objects. It is only with such systems that we are concerned here. Unless otherwise noted, 'system' will always be used to mean 'concrete system' (Ibid.).

4.C.3.2.1. Modes of Operations: Triggers and Scanners

Here, the author would like to discuss briefly some specific characteristics of what one might call output hierarchies, regardless of whether the output is a *baby*, or a *sentence spoken in English*. Koestler's (1972) notes that however much their products differ, all output hierarchies seem to have a classic mode of operation, based on the **trigger-releaser principle**, **where an implicit coded signal which may be relatively simple, releases complex, pre-set mechanisms**. For example, in *genetic reaction,* Waddington (1957) has convincingly shown that a single favourable gene can act as a trigger to release a kind of chain-reaction which affects a whole organ in a harmonious way. The genes act as chemical triggers, catalysing reactions. Also in *instinct behaviour*, we have releasers of a very simple kind - the red belly of the stickleback, the spot under the herring-gull's beak, which trigger off the appropriate behaviour (Tinbergen, 1951). In the performance of *acquired skills* we have also the same process of stepwise filling in of details of implicit commands issued from the apex of the hierarchy, such as 'strike a match and light this cigarette' or 'use our phrase-generating machine' - to transform an unverbalized image into innervations of the vocal chords.

The point that Koestler emphasizes is that this **spelling-out process from intent to execution**, cannot be described in terms of simple response images transferred from classical mechanics, only as a series of discrete steps. The **activated holon**, whether it is a government department or a living kidney, **has its own canon which determines the pattern of its activity**. Thus the signal from higher quarters does hot have to specify what the holon is expected to do; the signal merely has to trigger the holon into action by a coded message. Once thrown into action, the holon will spell out the implicit command in explicit form by activating its subunits in the appropriate strategic order, guided by feedbacks and feedforwards from its environment. Generally speaking, "**the holon is a system of relations**

which is represented on the next higher level as a unit" (Koestler, 1972, p. 239) (see Chapter 4 Section A on living organism processes - structural and functional hierarchies).

If we turn now to the input hierarchies of perception, as Koeslter notes: "the operations proceed, of course, in the reverse direction, from the peripheral twigs of the tree towards its apex; and instead of trigger-releasers we have the opposite type of mechanism, **a series of filters, scanners, or classifiers through which the input traffic must pass in its ascent from periphery to cortex**" (Ibid.). Koestler explains: "First you have lateral inhibition, habituation, and presumably some efferent control of receptors. On the higher levels are the mechanisms responsible for the visual and acoustic constancy phenomena, the scanning and filtering devices which account for the recognition of patterns in space and time, and enable us **to abstract universals** and **discard particulars**" (Ibid.). The colloquial complaint 'I have a memory like a sieve' may be derived from an intuitive grasp of filtering devices that operate **first all along the input channels, then along the storage channels**.

Therefore, in motor hierarchies, an implicit intention or generalized command is particularized, spelled out, step by step, in its descent to the periphery. In perceptual hierarchies, we have the opposite process: "**The peripheral input is more and more de-particularized, stripped of irrelevancies during its ascent to the centre. The output hierarchy concretizes, the input hierarchy abstracts**. The former operates by means of triggering devices, the latter by means of filtering or scanning devices..." (Ibid.). When we intend to write the letter R, a trigger activates a functional holon, an automatic pattern of muscle contractions, which produces the letter R in our own particular handwriting. When we read, a scanning device in our visual cortex identifies the letter R regardless of the particular hand that wrote it. Triggers release complex outputs by means of a simple coded signal. Scanners function the opposite way: they convert complex inputs into a simple coded signal.

4.C.3.2.2. Centre and Whole

It is now noticable that how it is important to see that there is an inductive process of creating abstract systems which are consisted of 'elements' and the 'relations between elements' - the 'assumptions'. Also we noticed that all these relational systems (Philosophic systems,

Languages and Arts) need to be examined in time-space dimensions. It is only with concrete systems that we are concerned here. This is in fact the only way of creating abstract systems from concrete systems and then examining them in concrete systems: a constantly constructing, examining, and reconstructing abstract systems in time-space dimension.

It means that all social life is a programmed activity with shifting relations in time and space governed by abstract systems. Its function is a process in time which for a social system the appearance of time-dependent function is the essential characteristic of its hierarchical organization. Therefore, it is worthwhile to emphasize the difference between living organism processes and the process of human thought. Unlike the emergence of order in living organism processes (see Figure 4.16) that there are first (**1**) **'fixed genetic information' carried by some material structure in *space-time dimension*** and second (2) 'pre-programmed functional instruction carried by time-dependent systematic interaction of elements' in *three dimensional synchronous space*; conversely, in the emergence of artificial order in thought there are first (1) as the source of systemness, 'generation of time-dependent systematic interaction of individuals' - carring purposeful social relations following the process of inputs, process, and outputs - to generate open-ended programmed functional instruction in *three dimensional synchronous space* , and second (**2**) **for transfering more useful information in order to get the open-ended ideal perfection, 'generation of open-ended symbolic information' carried by generation of open-ended material structure in *space-time dimension*** which all together creat the lawful structure of the thought of the subject (see Figure 4.16). The main point is that the process is reverse, and it is only through the transmission of the structure of thought that the process of pursuing purposes retains its stable form yet participates in a gradual evolution (Barghjelveh, 1996). It means that **societies are free in creating this structure which it is itself open-ended**.

It means that in both processes there are *coherent functions carried by dynamic controls*. But there is a main difference between these two controls: in 'living organism processes' it appears in **second step**, and it **results in** *hierarchical autonomous organized levels of authority of elements*; but, in 'the process of thought', it appears in **first step**, and it **is resulted from** *hierarchical autonomous organized levels of authority of individuals* (see Figure 4.16).

The difference is actually huge: in 'living organism processes' there are first 'fixed structured information' and 'fixed functional instruction' to gain the 'pre-programmed emergence of order' which is then **realized** by the assistance of the *time-dependent systematic interaction of elements*; but conversely, in the process of thought there are first *time-dependent systematic interaction of individuals* to assist the generation of 'open-ended emergence of artificial order in thought' which is then **potentialized** in the generation of 'open-ended functional instruction' and 'open-ended structured information' of the process of thought (see Figure 4.16).

'The Emergence of Order in Living Organism Processes'

Space - Time Dimension	Three Dimensional Synchronous Space
1) Structured Genetic Information	**2) Functional Coherent Instruction**
Transmission of Information Carried by **Fixed Material Structure**	Transmission of Instruction Carried by **Fixed Programme** Coherent Function Carried by Dynamic Controls Hierarchical Autonomous Organized Levels of Authority of Elements Time-Dependent Systematic Interaction of Elements

'The Emergence of Order in Human Thought Process'

Three Dimensional Synchronous Space	Space-Time Dimension
Time-Dependent Systematic Interaction of Individuals Hierarchical Autonomous Organized Levels of Authority of Individuals Coherent Function Carried by Dynamic Controls Transmission of Instruction Carried by **Open-Ended Generation of Programme**	Transmission of Information Carried by **Open-Ended Generation of Material Structure**
1) Functional Coherent Instruction	**2) Structured Symbolic Information**

Figure (4.16) The Comparison between the 'Emergence of Order in Living Organism Processes' and the 'Emergence of Order in Human Thought Process' (Source: The Author)

In fact, according to Figure (4.17), in all levels of living systems, there is an instinct structure of ordering functional instruction which are all pre-programmed. But, in the levels of Man and Society there is also another kind of structure, the knowledge structure, which is completely special in terms of being not pre-programmed. It is the structure of open-ended symbolic and social ordering of functional instruction in self-conscious and self-ideal system of the human mind. It is directed by abstract quality of thought, meaningly and desirously, in terms of formulation and evaluation of choices (see Chapter 4 Section D on the process space, Figure 4.31). In other words, it is absolutely free in creating itself which it is itself open-ended. There is also another kind of structure, the innate one. The author believes it is the pre-programmed structure of ordering religious instruction which continuously directs the quality of human mind to get the ideal perfection of his thought - the major focus of religious programmes.

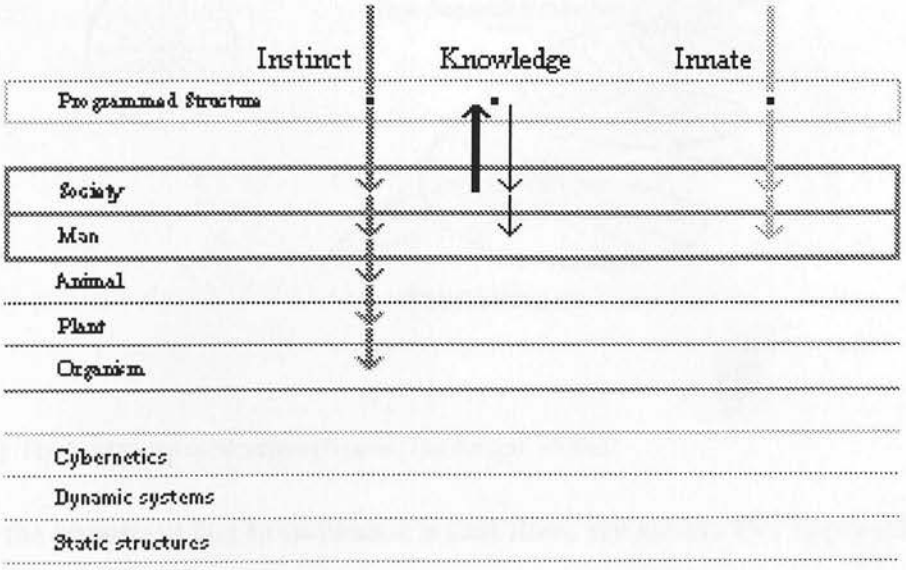


Figure (4.17) Different Levels and Different Orders (Source: The Author, 1997a)

But, as we noticed before "... all societies exist independent of any individual and individual is not the prime mover. Individual is the product of the society who acquires the structure of the society and is able to produce endless idiosyncratic transformation" (Hillier et al., 1972). Therefore, **in the reverse process of human thought with respect to the role of individual in the whole, there is a process which creates a centre** (a programmed structure of using

information) **and a whole** (idiosyncratic transformations of individuals' roles), **which is built into the structure and flow into each other, essentially they are interchangable** (Barghjelveh, 1997b). **It means that the whole process of thought creates a centre** (a structure) **which is constantly expanded and differentiated by individuals, and then the feed back is also constantly contracted and induced by the whole. The result continuously goes back to the centre and to go back would be to go against the order of things or the same the structure of the thought of the society** (Figure 4.18).

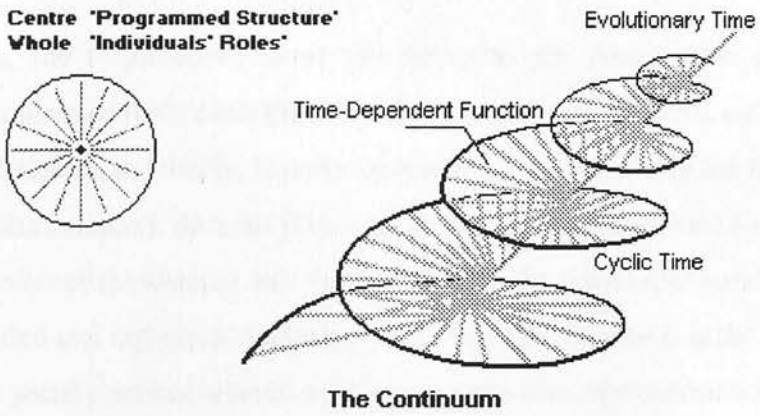


Figure (4.18) The Continuum of Structure (Source: The Author, 1997a)

Therefore, **the important fact to emphasize is that there are always two approaches: one is an inward process of regeneration and integration through the structure of the thought of the society, and the other is the outward pilgrimage of individuals** (Figure 4.19). **As one leads to the other, the initial expansion and exploration of the developing being is checked by its return from unlimited dissipation into the infinite. Movement along this way is at once aspiring and centring. Concentration not on static perfection but on the equilibrium of its essential flow. It is moving from one whole to achieve one particle which is more significant, passing through filters to achieve the essence, the centre** (Barghjelveh, 1997a).

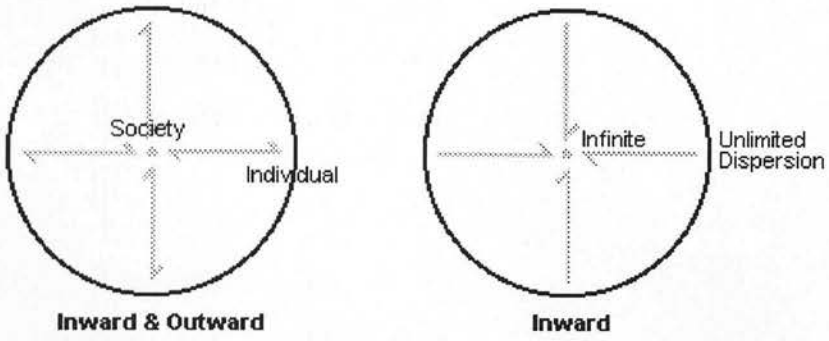


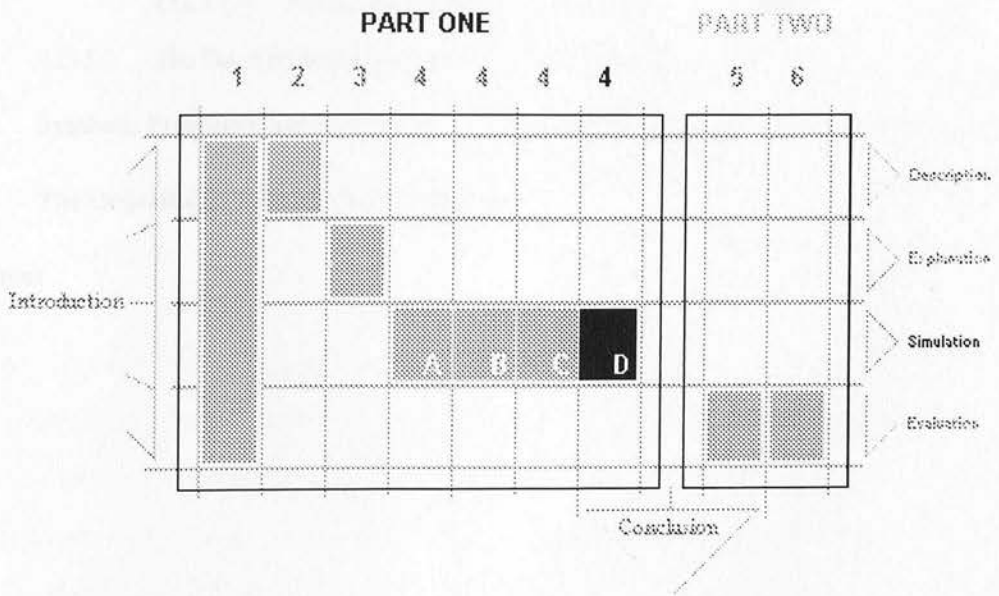
Figure (4.19) Inward and Outward Approaches (Source: The Author, 1997a)

Since, therefore, the major concerns of this outcome are: firstly, how do we *obtain information* ('communication'); secondly, how do we *make transmissible information* ('the structure of the thought'); and thirdly, how do we *examine the structure of the thought across space and time* ('the function'), the main plan is in fact to open up the debate about the nature of the *transformation* of the abstract structure of the thought across space and time which it is itself open-ended and not pre-programmed. As, therefore, 'function' is the subject of the study of concrete social practices ordered across *space* and *time*, the outcome would suggest the inquiry of *the process of space over time*. This is the principal issue with which the next section will be concerned, that of connecting the notion of human action with structural explanation in socio-spatial analysis.

4.D

CHAPTER FOUR

THE PROCESS OF SPACE



4.D

THE PROCESS OF SPACE

Introduction to Section 4.D

4.D.1. The Theory of Structuration

4.D.1.1. Structure, and Structural Constraints
4.D.1.2. Structure, and Structural Principles
4.D.1.3. Structure, and Structural Properties

4.D.2. The Duality of Structure

4.D.2.1. Social Integration, and System Integration
4.D.2.2. Space-Time Relations

4.D.2.2.1. Spatial Presence, and Temporal Presence
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4.D.3. The Social Organization of Space

4.D.3.1. The Study of Space

4.D.3.1.1. Space, and Artifacts
4.D.3.1.2. Space, and Relational Systems
4.D.3.1.3. Space, and By-Products
4.D.3.1.4. Space, and Objects
4.D.3.1.5. Space, and Systems of Appearance
4.D.3.1.6. Space, and Systems of Costitution of Order

4.D.3.2. The Function-Modelling of Process in the Organization of Space

4.D.4. Symbolic Principles and Instrumental Principles of the Organisation of Space

4.D.5. The Organization of Space in City Centres

Hypothesis

Introduction to Section 4.D

As in concrete systems, establishment of the existence and properties of elements and the nature of the relationships between them requires research with an empirical component in it such systems in our case, therefore, are the subject of study of social practices ordered across space and time. With focus on environmental situations, therefore, the outcome of the previous section would suggest that human societies build their spatial environment in order to construct a spatial structure. That, **the most fundamental properties of cities are their ordering of space into programmed systems with shifting relations in space and time for embodying social purposes**. So, in talking about cities, we need not to talk about objects, but about systems of purposeful relations and programmed functions. In a sense all urban design is about parts and whols. They are wholes in which good parts arise, rather than assembledges of parts into a whole. The spatial and functional complexity of cities suggests that the spatial form of cities, and especially their part/whole structure is programmed itself and can be replaced by a de-spatialized network of communications and transactions (Webber, 1964). But, the aim of this section is to emphasize that space is not simply a *function* of the *principles of the social reorganization* [as other abstract systems - author's emphasis] but an *intrinsic aspect* of it, a *necessary part of the social programming* (Hillier, 1989). It opens up, therefore, the debate about **the nature of transformation of abstract symbolic structures across space and time** which introduces **the process of concrete spatial structure over time**.

In fact the principal issue with which the section will be concerned is that of connecting the notion of **human action** with **structural explanation** in **socio-spatial analysis**. The making of such a connection, an adequate account of human agency must situate action in **space and time** as an **open-ended continuous flow of conduct**. As Giddens (1979) argues: The major theme in order to show the interdependence of action and structure is the necessity to grasp the **space-time relations inherent in the constitution of all social interaction** (p. 3). Such an envolving of *social systems* as situated in space-time can be effected by regarding *structure* as **non-spatial and non-temporal** as **a virtual order of differences** produced and reproduced in social interaction (Ibid.).

In fact, the term **'socio-spatial structure'** tends to include two elements: the ***patterning of interaction***, as implying relations between actors and elements; and the ***continuity of interaction in time*** (see Figure 4.20). This indicates that the structure is concerned with **the ordered relation of parts to a whole**: first (1) **with the arrangement in which the elements are linked together**, and second (2) **the mode in which the relation between moment and totality expresses itself in *reproduction***. Actually the second one is distinct from that involves in the relation of 'parts' and 'wholes' in the co-ordination of actors and elements in *socio-spatial systems*.

Structure: Ordered Relation of Parts to a Whole

1) 'With the organisation in which the elements are linked together' **or** 'the patterning of interaction, as implying relations between actors and element's - **'Structural Hierarchy'**

2) 'With the mode in which the relation between moment and totality expresses itself in reproduction' **or** 'the continuity of interaction in time' - **'Functional Hierarchy'**

Figure (4.20) The Continuity of Structure - Levels of Hierarchy (Source: The Author)

In fact, the process also comprises not only *open-ended socio-spatial functional programmes* involving transmission of 'formative idea' across space and time but also provides *open-ended socio-spatial symbolic assumptions* involving transmission of 'meaningful information' over time (see Figure 4.21).

'Open-Ended Socio-Spatial Functional Programmes'
(Three Dimentional Synchronous Space)

'Openen-Ended Socio-Spatial Symbolic Assumptions'
(Space-Time Dimension)

Figure (4.21) The Two Dimensions of Socio-Spatial Structure (Source: The Author)

Structure is thus the mode in which the evolutionary environment expresses itself in

reproduction. **And 'structural analysis' involves studying the conditions in which socio-spatial systems, via the application of generative rules and resources are produced and reproduced in interaction**. Since structure only exists as structural properties - the 'binding' of time and space carried by dynamic controls in socio-spatial systems - the main question is how actually a built form as a spatial property operates in every day practice?

4.D.1. The Theory of Structuration

To quote Giddens (1984), the basic domain of study of the social sciences, according to the theory of structuration, is neither **the experience of the individual actor**, nor **the existence of any form of social totality**, but **social practices ordered across space and time**. **Human social activities**, like some self-reproducing items in nature, are **recursive**. That is to say, they are not *brought* into being by social actors but continually *recreated* by them via the very means whereby they express themselves *as* **actors**. In and through their activities agents reproduce the conditions that make these activities possible. However, **the sort of 'knowledgeability' displayed in nature, in the form of coded programmes, is distant from the cognitive skills displayed by human agents**. ***It is in the conceptualizing of human knowledgeability and its involvement in action***:

> "It is the specifically **reflexive form of the knowledgeability of human agents** that is most deeply involved in the recursive ordering of social practices. **Continuity of practices presumes reflexivity, but reflexivity in turn is possible only because of the continuity of practices that makes them distinctively 'the same' across space and time**. **'Reflexivity'** hence should be understood not merely as 'self-consciousness' but as **the monitored character of the ongoing flow of social life**. To be a human being is to be a purposive agent, who both has reasons for his or her activities and is able, if asked, to elaborate discursively upon those reasons" (p. 3).

According to Giddens, "... human action occurs as a ***duree***, a **continuous flow of conduct**, as does cognition. Purposive action is not composed of an aggregate or series of separate intention, reasons and motives. Thus it is useful to speak of reflexivity as grounded in **the continuous monitoring of action** which human beings display and expect others to display."

The reflexive monitoring of action depends upon **'rationalization'**, understood by Giddens as a process rather than a state and as inherently involved in the competence of agents:

> "'Action' is not a combination of 'acts': 'acts' are constituted only by a discursive moment of attention to the *durée* of lived - through experience. **Nor can 'action' be discussed in separation from the body, its mediations with the surrounding world and the coherence of an acting self**" (p. 3).

The **mutual knowledge** incorporated in encounters, is not directly accessible to the **consciousness** of actors. Most such knowledge is **practical** in character: it is inherent in the **capability to 'go on' within the routines of social life**. The line between discursive and practical consciousness is fluctuating and permeable, both in the experience of the individual agent and as regards comparisons between actors in different contexts of social activity. There is no bar between these, however, as there is between the unconscious and discursive consciousness. Giddens states:

> "The unconscious includes those forms of cognition and impulsion which are either wholly repressed from consciousness or appear in consciousness only in distorted form. Unconscious motivational components of action, as psychoanalytic theory suggests, have an internal hierarchy of their own, a hierarchy which expresses the 'depth' of the life history of the individual actor" (pp. 4-5).

In saying this Giddens does not imply an uncritical acceptance of the key theorems of Freud's writings. He says we should guard against two forms of reductionism which those writings suggest. One is a **reductive conception of institutions** which, **in seeking to show the foundation of institutions in the unconscious, fails to leave sufficient play for the operation of autonomous social forces**. The second is a **reductive theory of consciousness** which, wanting to show how much of social life is governed by dark currents outside the scope of actors' awareness, **cannot adequately grasp the level of control which agents are characteristically able to sustain reflexively over their conduct**.

The stratification model of the agent can be represented as in Figure (4.22). The reflexive monitoring of activity is a chronic feature of everyday action and involves the conduct not just of the individual but also of others. That is to say, actors not only monitor continuously the flow of the activities and expect others to do the same for their own; they also routinely monitor aspects, social and physical, of the contexts in which they move. By the rationalization of action, Giddens means that actors - also routinely and for the most part without fuss - maintain a continuing 'theoretical understanding' of the grounds of their activity. As he has mentioned, having such an understanding should not be equated with the discursive giving of reasons for particular items of conduct, nor even with the capability of specifying such reasons discursively.

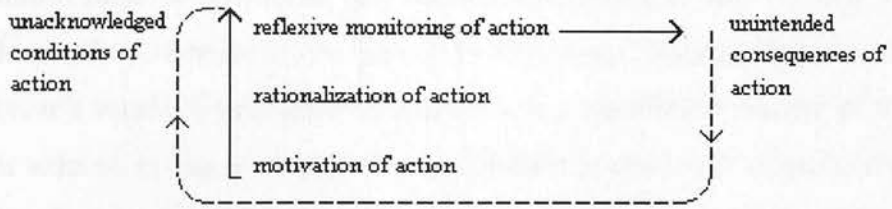

Figure (4.22) The Stratification Model of the Agent (Source: Giddens, 1984, p. 5)

Giddens also distinguishes the 'reflexive monitoring' and 'rationalization' of action from its **'motivation'**: "**If reasons refer to the *grounds of action*, motives refer to the *wants* which prompt it**" (p. 6). However, he has mentioned, motivation is not as directly bound up with the continuity of actions as are its 'reflexive monitoring' or 'rationalization'. **Motivation refers to potential for action rather than to the mode in which action is chronically carried on by the agent**. Motives tend to have a direct purchase on action only in relatively unusual circumstances, situations which in some way break with the routine. For the most part, according to Giddens, **motives supply overall plans** or **programmes - 'projects'** - within which a range of conduct is enacted. He has emphasized that "much of our day-to-day conduct is not directly motivated." But, as the study proposed in previous sections, life is a programmed activity with shifting relation in space and time, an organization of purposeful -

not purposive - entities in space and time which is always organized around its programme - the ideal. It is the relationships between what purposeful elements do and the pursuit of their common purpose that give unity and identity to their organization. This programme is always presented in space-time dimension. Without such a common purpose the elements would not work together unless compelled to do so. A group of unwilling prisoners or slaves can be organized and forced to do something that they do not want to do, but if so they do not constitute an organization even though they may form a system. An organization consists of elements that have and can exercise their own wills. It means that "a system which can choose between different outcomes can place different values on different outcomes" (Ackoff, 1971, p. 666). This, therefore, characterizes the progress of whole programme over time.

Mentioned by Giddens (1984), **while competent actors can nearly always report discursively about their intentions in, and reasons for, acting as they do, they cannot necessarily do so of their motives. As traced by the study, because they are deeply involved in actor's ideals. Unconscious motivation is a significant feature of human conduct. It is related to the structure of mind which is gradually constructed and reconstructed in the process of life**. But, as mentioned by Giddens "**the notion of practical consciousness is fundamental.... It is that characteristic of the human agent or subject to which structrualism has been particularly blind**" (p. 6). **The study also proposes that the notion of *practical consciousness* is fundamental because it is that characteristic of human agents or subjects which either *consciously choose sufficient play for the operation of autonomous social forces* or *consciousley grasp the level of control which agents are characteristically able to sustain reflexively over their conduct*, both directed in three dimensional synchronous space. It gradually constructs and reconstructs the structure of open-ended social and purposeful/ideal-seeking process of their thought over time. It thus constantly *redirects* the significant feature of human mind, the unconscious motivation of human conduct.**

Between discursive and practical consciousness, therefore, there is no bar; there are only the differences between **what can be said** and **what is characteristically simply done**. However, there are barriers, centred principally upon repression, between discursive

consciousness and the unconscious (Figure 4. 23).

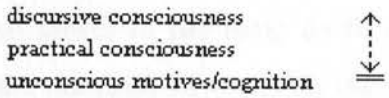

Figure (4.23) Between Discursive Consciousness and the Unconscious (Source: Giddens, 1984, p. 7)

The *durée* of day-to-day life occurs as a flow of intentional action. However, acts have **unintended consequences**; and, as indicated in Figure (4. 22), **unacknowledged conditions** of further acts. Thus, one of the regular consequences of our speaking or writing English in a correct way is to contribute to the reproduction of the English language as a whole. Our speaking English correctly is intentional; the contribution we make to the reproduction of the language is not. But how should we formulate what unintended consequences are?

Giddens has pointed out that it is not enough to isolate functional relations in order to explain why such feedback occurs. How, then, does it happen that cycles of unintended consequences feed back to promote social reproduction across long periods of time? In a general way, this is not difficult to analyse. Repetitive activities, located in one context of time and space, have regularized consequences, unintended by those who engage in those activities, in more or less 'distant' time-space contexts. What happens in this second series of contexts then, directly or indirectly, influences the further conditions of action in the original context. ***To understand what is going on no explanatory variables are needed other than those which explain why individuals are motivated*** *(i.e. their ideals)* ***to engage in regularized social practices across time and space, and what consequences ensue. The unintended consequences are regularly 'distributed' as a by-product of regularized behaviour reflexively sustained as such by its participants***.

This is actually the **outward pilgrimage of individuals** which creates the **inward process of regeneration and integration through the structure of the thought of the society**. The fact that the initial expansion and exploration of the developing being is checked by its return from unlimited dissipation into the infinite. The same, that there are: (1) first, as the source of systemness, 'generation of time-dependent systematic interaction of individuals' carried by

purposeful social relations following the process of inputs, process, and outputs in *three dimensional synchronous space*; and (**2**) **second, for transfering more useful information in order to get closer to the ideal perfection, 'generation of symbolic information' carried by some material structure in *space-time dimension*** which both together create the lawful structure of the thought of the subject (see Chapter 4 Section C). **It is in fact emphasizing on inductive process of creating symbolic principles of whole society across varing spans of time and space**.

Therefore, in order to explain more, let me now move to the core of the debate - the structuration theory: the concepts of 'structure', 'system' and **'duality of structure'**. As Giddens (1984) argues the notion of structure (or 'social structure'), of course, is very prominent in the writings of most functionalist authors and has lent its name to the traditions of 'structuralism'. But in neither instance is this conceptualized in a fashion best suited to the demands of social theory. Functionalist authors and their critics have given much more attention to the idea of 'function' than to that of 'structure', and consequently the latter has tended to be used as a received notion. But there can be no doubt about how 'structure' is usually understood by functionalists and, indeed, by the vast majority of social analysts - as some kind of 'patterning' of social relations or social phenomena. This is often naïvely conceived of in terms of visual imagery, akin to the skeleton or morphology of an organism or to the girders of a building. Such conceptions are closely connected to the **dualism of subject and social object**: **'structure' here appears as 'external' to human actions**, as **a source of constraint on the free initiative of the independently constituted subject**. As conceptualized in structuralist and post-structuralist thought, on the other hand, the notion of structure is more interesting. Here **it is characteristically thought of not as a patterning of presences** but **as an intersection of presence and absence**; **underlying codes have to be inferred from surface manifestations**.

These two ideas of structure might seem at first sight to have nothing to do with one another, but in fact each relates to important aspects of the **structuring of social relations**, aspects which, in the theory of structuration, are grasped by recognizing a differentiation between the concepts of 'structure' and 'system'. As Giddens (1984) mentions:

> "In analysing social relations we have to acknowledge both a syntagmatic dimension, the patterning of social relations in time-space involving the reproduction of situated practices [functional hierarchy - author's emphasis], and a paradigmatic dimension, involving a virtual order of 'modes of structuring' recursively implicated in such reproduction [structural hierarchy - author's emphasis]. In structuralist traditions there is usually ambiguity over whether structures refer to **a matrix of admissible transformations within a set** [functional hierarchy - author's emphasis] or **to rules of transformation governing the matrix**" [structural hierarchy - author's emphasis] (p. 17).

Giddens treats structure, in its most elemental meaning at least, as referring to such rules (and resources). It is misleading, however, to speak of 'rules of transformation' because all rules are inherently transformational. **'Structure'** thus refers, in social analysis, to **the structuring properties** allowing **the 'binding' of time-space** in social systems, **the properties which make it possible for discernibly similar social practices to exist across varying spans of time and space and which lend the 'systemic' form**. As Giddens states:

> "To say that structure is a 'virtual order' of transformative relations means that social systems, as reproduced social practices, do not have **'structures'** but rather exhibit **'structural properties'** and that structure exists, as **time-space presence**, only in its **instantiations in such practices** [i.e. functional hierarchy - author's emphasis] and as **memory traces orienting the conduct of knowledgeable human agents**" [i.e. structural hierarchy - author's emphasis] (Ibid.).

This does not, therefore, prevent us from conceiving of **'structural properties'** as **hierarchically organized in terms of the time-space extension of the practices they recursively organize**. **The most deeply embedded structural properties, implicated in the reproduction of societal totalities**, Giddens calls **'structural principles'**. **Those practices which have the greatest time-space extensions within such totalities can be referred to** as **'institutions'**. In fact Giddens distinguishes 'structure' as a generic term from 'structures' in the plural and both from the 'structural properties of social systems'. **'Structure'** refers not

only to **rules implicated in the production and reproduction of social systems** but also to **resources**. As ordinarily used in the social sciences, 'structure' tends to be employed with the more enduring aspects of social systems in mind, and Giddens does not want to lose this connotation. The most important aspects of structure are rules and resources recursively involved in institutions. Institutions by definition are the more enduring features of social life. In speaking of the structural properties of social systems Giddens means their institutionalized features, giving 'solidity' across time and space. He uses the concept of **'structures'** to get at **relations of transformation and mediation** [i.e. **functional hierarchy** - author's emphasis] **which are the 'circuit switches' underlying observed conditions of system reproduction**.

4.D.1.1. Structure, and Structural Constraints

Structuration theory is, therefore, based on the proposition that structure is always both **'enabling'** and **'constraining'**, in virtue of the inherent relation between structure and agency. Giddens (1984) argues, however, that the theory of structuration in no way minimizes the significance of the constraining aspects of structure. But 'constraint' tends to have several senses; and 'constraint' cannot be taken as a uniquely defining quality of 'structure':

> "In structuration theory structure has always to be conceived of as a property of social systems, *'carried' in reproduced practices imbedded in time and space*. Social systems are *organized hierarchically and laterally within societal totalises*, the institutions of which form 'articulated ensembles'. If this point is ignored, the notion of 'structure' in the theory of structuration appears more than it really is" (p. 170).

One of the circumstances which Durkheim usually associates with constraint depends upon the observation that the *longue duree* of institutions both **pre-exists** and **outlasts** the lives of individuals born into a particular society. This is not only wholly compatible with structuration theory but is also inherent in its very formulation - although the 'socialization' of the individual into society should be understood as involving mutual time process, connecting the 'life-cycles' of both infant and parental figures. In his earlier writings, as Giddens (1984) writes, Durkheim heavily emphasized the constraining elements of socialization, but later he in fact came to see more and more clearly that socialization fuses constraint and entablement. This is easily

demonstrated in the instance of learning a first language. No one 'chooses' his or her native language, although learning to speak it involves definite elements of compliance. Since any language constrains thought (and action) in the sense that it presumes a range of framed, rule-governed properties, the process of language learning sets certain limits to cognition and activity. But by the very same token the learning of a language greatly expands the cognitive and practical capacities of the individual.

4.D.1.2. Structure, and Structural Principles

Thus, the 'problem of order' in the theory of structuration is the problem of how it comes about that social systems 'bind' time and space, incorporating and integrating presence and absence. This in turn is closely bound up with the problematic of time-space distanciation, the 'stretching' of social systems across time-space: "'Structural principles' can be understood as **the principles of organization which allow recognizably consistent forms of time-space distanciation on the basis of definite mechanisms of societal integration** (Ibid., p. 180)."

4.D.1.3. Structure, and Structural Properties

Therefore, the concept of structure may be used in a technical and in a more general way. Understood as rules and resources, structure is recursively implicated in the reproduction of social systems and is wholly fundamental to structuration theory. Used in a looser fashion, structure can be spoken of as referring to the institutionalized features (structural properties) of societies. In both usages 'structure' is a generic category involved in each of the structural concepts given below by Giddens (1984):

1) "**Structural Principles:** Principles of organization of societal totalities;
2) **Structures:** Rule-resource sets, involved in the institutional articulation of social systems;
3) **Structural Properties:** Institutionalized features of social systems, stretching across time and space" (p. 185).

The identification of structural principles, and their conjunctures in intersocietal systems, represents the most comprehensive level of institutional analysis (Figure 4.24). That is to say,

the analysis of **structural principles** refers to modes of **differentiation and articulation of institutions across the 'deepest' reaches of time-space**. The study of **structural sets**, or ***structures***, involves the **isolating of distinct 'clusterings' of transformation/mediation relations implied in the designation of structural principles**. Structural sets are formed by the mutual convertibility of the rules and resources implicated in social reproduction.

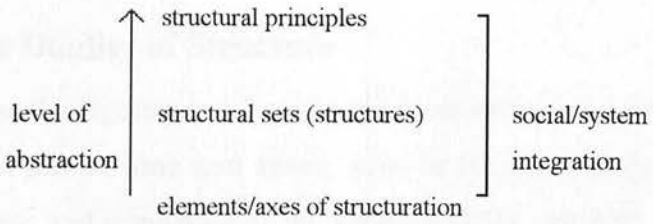

Figure (4.24) Levels of Institutional Analysis (Source: Giddens, 1984, p. 188)

Analysing circuits of reproduction, therefore it should be clear, **is not equivalent to identifying the sources of social stability alone**. **They serve indeed to indicate some of the main forms of change involved in the transition from one type of societal totality to another**. A reproduction circuit has been sketched in diagrammatic form by Giddens (1984). (see Figure 4.25)

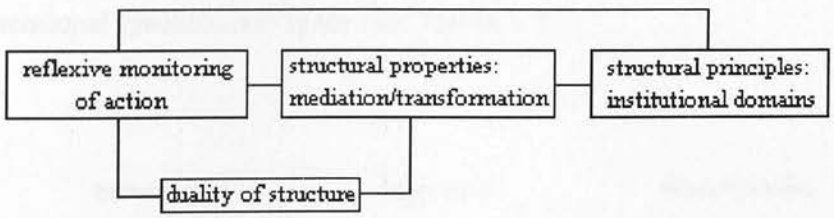

Figure (4.25) Circuit of Reproduction (Source: Giddens, 1984, p. 191)

All structural properties of social systems, therefore, are the **medium** and **outcome** of the contingently accomplished activities of situated actors. **The reflexive monitoring of action in situations of co-presence is the main anchoring feature of social integration**, but **both the *conditions* and the *outcomes* of situated interaction stretch far beyond those**

situations as such. They are also involved in the inductive process of creating the value system of formulation or evaluation of choices in comming societal integration or societal totality, continiuty of inducing principles of organization or in other words structural principles in time-space dimension. ***That is to say, understanding the conditions of system reproduction becomes part of those conditions of system reproduction as such.***

4.D.2. The Duality of Structure

To summarize the argument so far, **structure, as recursively organized sets of rules and resources, is out of time and space, save in its instantiations and co-ordination as memory traces, and is marked by an 'absence of the subject'**. The study proposes that it is in fact the *hierarchy of rules and resources* or *structural hierarchy of open-ended symbolic assumptions* induced by the whole society in space-time dimension (see Figure 4.21). **The social systems in which structure is recursively implicated, on the contrary, comprise the situated activities of human agents, reproduced across time and space**. But, **analysing the structuration of social systems means studying the modes in which such systems grounded in the knowledgeable activities of situated actors who draw upon rules and resources in the diversity of action contexts, are produced and reproduced in interaction**. The study also proposes that it is in fact studying the *hierarchy of function* or *functional hierarchy of open-ended social programmes* reproduced by individual actors in three dimensional synchronous space (see Figure 4.21).

Structure(s)	**System(s)**	**Structuration**
Rules and resources, or sets of transformation relations, organized as properties of social systems	Reproduced relations between actors or collectivities, organized as regular social practices	Conditions governing the continuity or transmutation of structures, and therefore the reproduction of social systems
Structural Hierarchy		**Functional Hierarchy**

Figure (4.26) Structural and Functional Hierarchies (Source: The Author, after Giddens, 1984, p. 25)

Crucial to the idea of structuration is so the theorem of **the duality of structure**, which is logically implied in the arguments portrayed above: "**The constitution of agents and structures are not two independently given sets of phenomena, a dualism, but represent a duality**. According to the notion of the duality of structure, **the structural properties of social systems are both medium and outcome of the practices they recursively organize**" (Giddens, 1984, p. 25).

For knowledgeability is founded less upon discursive than practical consciousness. The knowledge of social conventions, of oneself and of other human beings, presumed in being able to 'go on' in the diversity of contexts of social life is detailed and dazzling. All competent members of society are vastly skilled in the practical accomplishments of social activities and are expert 'sociologists'. The knowledge they possess is not incidental to the persistent patterning of social life but is integral to it. Giddens (1984) states: "This stress is absolutely essential if the mistakes are to be avoided, mistakes which, suppressing or discounting agents' reasons - the rationalization of action as chronically involved in the structuration of social practices - look for the origins of their activities in **phenomena** of which these **agents are ignorant**. But it is equally important to avoid tumbling into the opposing error of hermeneutic approaches and of various versions of phenomenology, which tend to regard society as the plastic creation of human subjects. Each of these is an illegitimate form of reduction, deriving from a failure adequately to conceptualize the duality of structure" (p. 26).

According to structuration theory, the moment of the production of action is also one of reproduction in the contexts of the day-to-day enactment of social life. This is so even during the most violent upheavals or most radical forms of social change. **It is not accurate to see the structural properties of social systems as 'social products' because this tends to imply that pre-constituted actors somehow come together to create them**. In reproducing structural properties to repeat a phrase used earlier, agents also reproduce the conditions that make such action possible. **Structure has no existence independent of the knowledge that agents have about what they do in their day-to-day activity**. Giddens (1984) mentions:

"The duality of structure is always the main grounding of continuities in social

> reproduction across time-space. It in turn presupposes the reflexive monitoring of agents in, and as constituting, the *durée* of daily social activity. But human knowledgability is always bounded. The flow of action continually produces consequences which are unintended by actors, and these unintended consequences also may form unacknowledged conditions of action in a feedback fashion.... **Human history is created by intentional activities but is not an intended project**; it persistently eludes efforts to bring it under conscious direction. However, such attempts are continually made by human beings, who operate under the threat and the promise of the circumstance that they are the only creatures who make their 'history' in cognizance of that fact" (pp. 26-7).

And this is the whole point of the process of human thought in producing open-ended symbolic assumptions of organization over time (structural hierarchy). **It is itself open-ended to look for the ultimate perfection of ideals by the very mean of open-ended functional programmes across time-space** (functional hierarchy). Therefore, **it is the purposeful ideal-seeking process of human thought that constantly directs and redirects unintended consequences and unacknowledged conditions of action which are produced and reproduced in interaction. It does this in a feedback fashion by the very reflexive monitoring of agents in, and as constituting, the *durée* of daily social activity. So the duality of structure is always the main grounding of continuities of perfect ideals in social reproduction of purposes across time-space**.

4.D.2.1. Social Integration, and System Integration

To grasp, therefore, the monitored processes of reproduction conceptually, we have to make certain distinctions relevant to what social systems 'are' as reproduced practices in interaction settings. The relations implied or actualized in social systems are, of course, widely variable in terms of their degree of 'looseness' and permeability. But, this being accepted, we can recognize two levels in respect of the means whereby some element of 'systemness' is achieved in interaction. One is that where interdependence is conceived of as a homeostatic process akin to mechanisms of self-regulation operating within an organism. There can be no objection to this as long as it is acknowledged that the 'looseness' of most social systems makes the

organic parallel a very remote one and that this relatively 'mechanized' mode of system reproduction is not the only one found in human societies. **Homeostatic system reproduction in human society can be regarded as involving the operation of causal loops** (see Chapter 4 Section B, Figure 4.14), **in which a range of unintended consequences of action feed back to reconstitute the initiating circumstances**. But in many contexts of social life **there occur processes of selective 'information filtering' whereby strategically placed actors seek reflexively to regulate the overall conditions of system reproduction either to keep things as they are or to change them**.

Giddens argues that the distinction between **homeostatic causal loops** and **reflexive self-regulation** in system reproduction must be complemented by one further, and final, one: that between **'social'** and **'system'** ***integration***: "'Integration' may be understood as involving reciprocity of practices (**of autonomy and dependence**) between actors or collectivities. **'Social integration' then means systemness on the level of face-to-face interaction**. **'System integration' refers to connections with those who are physically absent in time or space**" (Figure 4.27). The mechanisms of system integration certainly presuppose those of social integration, by such mechanisms are also distinct in some key respects from those involved in relations of co-presence.

Social Integration	**System Integration**
Reciprocity between actors in contexts of co-presence	Reciprocity between actors or collectivities across extended time-space

Figure (4.27) Social and System Integrations (Source: Giddens, 1984)

4.D.2.2. Space-Time Relations

The point of view the author uses here is influenced by Heidegger's treatment of **being** and **time**. William James echoes aspects of Heidegger's view when he says of time: "**The literally present moment is a purely verbal supposition, not a position**; the only present ever realised concretely being the 'passing moment' in which the dying rearward of time and its dawning future forever mix their lights." In this relation Giddens (1979) explains:

> "The temporality of the interweaving of nature and society is expressed in the finitude and contingency of the human being which is the only link between the continuity of 'first' and 'second nature'. The relentlessness of the 'passing-away' of time is captured by the linguistic affinity with the inevitable 'passing-away' of the human being. **The contingency of the human being is not merely in the association of being-in-time with being-in-space but**, as Heidegger shows, **in the very constitution of 'existents'** (in social theory, the constitution of society in structuration" (p. 3).

Therefore, if time were merely a succession of nows, contingently associated with spatial presence, it would be impossible to understand why time does not go backwards: but if time is the 'becoming of the possible', the 'progression' of time is clarified. Heidegger held that "... every existent is a be-ing that is temporal... Being appears to us, in time, as the Becoming of the Possible... futurity comes into our ken in terms of possibilities... the question of time is transcendentally the ontology of the possible." Similarly, for Leibnitz: "... **we cannot treat time and space as receptacles 'containing' experience, because it is only possible to understand time and space in relation to objects and events: time and space are the modes in which objects and events 'are' or 'happen'**."

But, what Giddens appears to add is the necessary insertion of a paradigmatic dimension in time-space relations, that **'time'**, **'space'** and **'virtual time-space'** (or structure) - **the threefold intersection of difference - are necessary to the constitution of the real**. Thus 'action' or agency does not refer to a series of discrete acts combined together, but to *a continuous flow of conduct*: "We may define action as involving a 'stream of actual or contemplated causal interventions of corporeal beings on the ongoing process of events-in-the-world'."

Also Giddens (1979) argues that most forms of social theory have failed to take seriously enough **not only the temporality of social conduct but also its spatial attributes**. At first sight, nothing seems more banal than to assert that social activity occurs in time and in space. But neither time nor space have been incorporated into the centre of social theory; rather, they are ordinarily treated more as 'environments' in which social conduct is enacted. In regard of

time, this is primarily because of the influence of synchrony/diachrony differentiation: "... the assimilation of time and change has the consequence that time can be treated as a sort of 'boundary' to stable social orders, or at any rate as a phenomenon of secondary importance" (p. 202). Shils (1975) explains:

> "Time provides not only a setting which permits the state of one moment to be compared heuristically with that of another moment but is also a constitutive property of society. Society is only conceivable as **a system of varying states occurring at moments in time**. **Society displays its characteristic features not at a single moment in time but in various phases assuming various but related shapes at different and consecutive moments of time**" (p. xiii).

Giddens concludes that most schools of social theory have failed to situate interaction in time, because they have operated within a **synchronic/diachronic division**. A synchronic image of a social system writes out social reproduction, or at least takes it for granted. In fact, the other side of the assimilation of time and change, as Giddens (1979) notes, is "**the equation of the a-temporal or the static with stability**" (p. 202). When social analysts writing in this vein speak of systems of interaction as 'patterns' they have in mind, often in a fairly vague way, **a sort of 'snapshots' of relations of social interaction**. The flaw in this is exactly the same as that involved in the presumption of **'static stability'**: such a snapshot would not in fact reveal a pattern at all, because **any patterns of interaction that exist are situated in time**; **only when examined over time (i.e diachronic image of a social system) do they form 'patterns' at all**. This is most clear, perhaps, in the case of individuals in face-to-face encounters. The concern of the ethnomethodological writers points up something important: **the seriality of the activities of the participants** (Sacks, and Schegloff, 1974). It is not just a trivial and obvious feature of conversational talk that only one person usually speaks at a time: the ethnomethodological study of conversation has, however, made a significant contribution in stressing that the 'managing' of talk by social actors routinely employs the location of a conversation in time as mode of organising that conversation (Garfinkel, 1967).

The suppression of **space** in social theory also derives from different origins, probably in some

part from the anxiety of sociological authors to remove from their works any hint of geographical determinism. **The importation of the term 'ecology' into the social sciences has done little to help matters, since this tends both to encourage the confusion of the spatial with other characteristics of the physical world that might influence social life, and to reinforce the tendency to treat spatial characteristics as *in the 'environment' of social activity*, rather than as *'integral' to its occurrence*.**

4.D.2.2.1. Spatial Presence, and Temporal Presence

The distinction commonly made between 'micro-' and 'macro-sociological' studies does not really help to elucidate some of the key differences between face-to-face interaction and other types of interactive relation in terms of which social systems are constituted. The term face-to-face, however, does convey a sense of the importance of the positioning of the body in space in social interaction. The face is of course normally the focus of attention in social encounters, and as the most expressive part of the body in chronically monitored by actors in checking upon the sincerity of the discourse and acts of others. Not all interaction which takes place in the presence of others, where sensibility of that presence influences that interaction, is 'face-to-face': some instances of crowd behaviour may be an exception to this. But most such examples are quite marginal: it is striking how far, even in large-scale assemblies, the term 'face-to-face' still applies in a significant way. In assemblies, lectures, concerts, etc., the positioning of the audience is nearly always such that the members of the audience collectively face the performers. In face-to-face interaction, the presence of others is a major source of information utilised in the production of social encounters. The micro- versus macro-sociological distinction so puts an emphasis upon contrasting small groups with larger collectivities or communities; **but a more profound difference is between face-to-face interaction and interaction with others who are physically absent and often temporally absent also**.

In fact the extension of social systems in space and in time is an evident feature of the overall development of human society. The extension of interaction in time is opened out in a fundamental way by the development of **writing**. **Tradition** in **non-literate** cultures incorporates the sum of the cultural products of past generations; but the emergence of the

text makes possible communication with the past in a much more direct way, and in a fashion which bears certain similarities to interaction with physically present individuals (Ricoeurn, 1971). The access to the past that is opened up by the material existence of texts is however a **distanciated interaction**, if we contrast it to the presence of others in face-to-face interaction. In a sense, the study proposes that this kind **is not involved with actual experience of the continuity of conduct**. Therefore, it neither **has the ability to incorporate the sum of the cultural products of past generations *in a space-time dimension*** nor **the ability to develop the structure of the past achievements *over time***. It means it has the lack of an actual experience of the continuity of conduct.

The development of writing greatly extends the scope of distanciated interaction in time as well as in space. In cultures which do not have writing, contact both within the cultural group as well as with other groups is perforce always of a face-to-face kind. Of course in these circumstances actors themselves can act as mediators between others. But writing alters the nature of the transactions that can be carried out: the letter by-passes its carrier, and 'speaks' directly to its recipient. It should be noticed that the extension of interaction in space expressed in the transmitting of a letter from a sender to a recipient also involves the temporal absence of the sender, *via-a-vis* the moment of communication when the letter is opened and read. The temporal gap between an exchange of letters is obviously much greater than that in the 'turn-taking' of conversation; on the other hand, of course, one of the main features of modern technologies of communication is that they no longer allow distance in space to govern temporal distance in mediated interaction. The telephone recaptures the immediacy of face-to-face interaction across spatial distance, at the cost of the restriction of the sensory context of communication; television and video communication restore considerably more, by returning distanciated interaction to a face-to-face form (McCluhan, 1962).

Also from the other hand, time, space and repetition are closely intertwined. All known methods of assessing or calculating *time* involve repetition: the cyclic movement of the sun, the hands on a watch, etc.; **all involve motion in space**. Michael Whitman (1967) expresses:"It seems that, however accurate the repetitive control elements of the clock may be, **one can never arrive at a concept of standard time-duration prior reference to space**

congruence. In fact, the more accurate the clock, the more complex are the spatio-temporal physical laws which have to be known and utilised" (p. 71). Hence, it is difficult to speak of time without reference to spatial metaphors. This also attests to the closeness of the connections between **time**, **space** and **repetition** in social life. The cyclical character of repetition or social reproduction in societies governed by **tradition** is geared indirectly to the **experience** and **mapping of time**. This also indicates the importance of actual and real repetition of activities across space and time which opens up the opportunity to experience them as a continuous flow of conduct to get either **the ability to incorporate the sum of the cultural products of past generations *in space-time dimension*** or **the ability to develop the structure of the past achievements *over time***. But, the experience of time probably never entirely sheds its cyclical guise, even when 'linear time consciousness' comes to predominate. Just as calendars and clocks interpolate cycles into the sequential movement of time, so daily, weekly and annual periods of time continue to maintain cyclical aspects in the organisation of social activities. The same is true of the life-span of the individual, which we still continue aptly to call the 'life-cycle'.

Therefore, the extension of social life in time and space has been mentioned, as an overall characteristic of social development: time-scales of social activity are altered by the transmutation of communication over distance. The **interconnection of time and space** can be explored in terms of **the participation of social actors in cycles of social activity** as well as at **the level of the transformation of society itself** (Heller, 1978, pp. 170-96). Time-geography, therefore, deals with the time-space 'choreography' of individuals' existence over given time periods: the day, week, year or the whole life-time. A person's daily routine of activities, for example, can be charted as a path through time-space. Thus the social transition involved in leaving home to go to work is also a movement through space. Social interaction from this point of view can be understood as the 'coupling' of paths in social encounters, or what Hagerstrand calls 'activity bundles' (Pred, 1977, p. 208). 'Activity bundles' occur at definite 'stations' - buildings or other territorial units - where the paths of two or more individuals coincide; these encounters dissolve as actors move off in space and time to participate in other activity bundles. **The general importance of this conception of social activity as a 'weaving dance through space-time' is that it emphasizes the *co-ordination***

of movement in space and time **in social activity, as the coupling of a multiplicity of paths or trajectories** (Giddens, 1979). The same conception can be applied to much broader issues of social change: change in society can also be understood in terms of space-time paths. **Social development characteristically involves spatial as well as temporal movement**.

4.D.2.2.2. Spatial Presence, and Spatial Absence

The fact that the concept of social structure ordinarily applied in the social sciences - as like the anatomy of a body or the girders of a building - has been so pervaded by spatial imagery, may be another reason, together with the fear of lapsing into geographical determinism, why the importance of space itself has rarely been sufficiently emphasised in social theory.

Giddens (1979) argues that the social management of space is none the less in definite ways a feature of all societies. **Virtually all collectives have a locale of operation**. "**'Locale'** is in some respects a preferable term to that of 'place', more commonly employed in social geography: **for it carries something of the connotation of space used as a *setting* for interaction**" (p. 207). He continues: "**A setting is not just a spatial parameter, and physical environment, in which interaction 'occurs': it is these elements mobilised as part of the interaction. Features of the setting of interaction, including its spatial and physical aspects are routinely drawn upon by social actors in the sustaining of communication**" (Ibid.).

Therefore, if the notion of locale is combined with the influence of physical presence/absence (this being understood as potentially both temporal and spatial), Giddens characterises the **small community** as one in which there is only short distance in time-space separation. That is to say, the setting is such that all interaction has only a small 'gap' to carry over in crossing time and space. **It is not just physical presence in immediate interaction which matters in 'small-scale' interaction: it is the temporal and spatial availability of others in a locale**. In fact, no one has analysed such phenomena more perceptively than Goffman[1], who

[1] Goffman, Erving, 1959, *The Presentation of Self in Everyday Life*, New york, Doubleday; for the same Author's more recent views on some overlapping issues, see Goffman, *Frame Analysis*.

in all his writings has brought out the significance of space and place - or what in his first work he called 'region'. A region, in Goffman's sense, is part of what Giddens called a locale, which places bounds upon one or other of the major features of presence. **Regions differ in terms of how they are confined, as well as in terms of which features of presence they might 'let through'**. A thick glass screen in a broadcasting studio can be used to isolate a room aurally but not visually. **Regions are usually defined, he points out, in terms of space-time relations**: the separation of 'living space' from 'sleeping space' in homes is also differentiation in times of use.

As proposed before, human social life is a programmed activity with shifting relations in space and time. Its function is a process in time, and for a social system the appearance of time-dependent function is the essential characteristic of its hierarchical organization. Since an aggregation of purposeful entities does not constitute an organization unless they have at least one common purpose, and this organization is always organized around its common purpose, it is the relationships between what purposeful individuals do and the pursuit of their common purpose that gives 'unity' and 'identity' to their organization. Thus, **the formative idea of social programming imposes variable constraints on the purpose of individuals. It is actually achieved by placing hierarchical bounds upon one or other of the major features of presense in terms of space-time relations. It means, regions are constantly differred (1) in terms of how they are confined *in three dimensional synchronous space*** (i.e. functional hierarchy of social programming), **as well as (2) in terms of which features of presence they might 'let through' *in space-time dimension*** (i.e. structural hierarchy of spatial symbols). **It is, therefore, with shifting relations in space and time that the temporal and spatial availability of locales are differed in terms of how they are hierarchicaly confined to get the formative idea of the social programming across space and time**. Human being has a character which creates symbols of, past and future, own and world. There is, therefore, always a close relationship between his assumptions and the life-cycle he constantly programmes in space. S/he unfolds the structure of laws of his or her thought in an open-ended/purposeful social organization of space.

In the case of space, therefore, the structural hierarchy of spatial symbols is itself

constantly involved in the practice. **It suggests that it is not enough to say spatial assumptions get gradually their structural hierarchy of symbols *in spatial experience of thought over time*, but they are also intrinsically involved in the social programming of the functional hierarchy of those symbols *in three dimensional synchronous spatial experience of practice***. It means, **it is itself by space that the symbolic space is created and confined for practice, and not that other created symbols including spatial symbols are practiced in the confined space**. Hence, **firstly**, space is intrinsically involved in the open-ended/purposeful social programming of the ideal-seeking process of thought - *in terms of how it is confined* - across space and time. And, **secondly**, as the *function* of the principles of the social reorganization it gets gradually the symbolic assumptions of those programming - *in terms of which features of presence they might 'let through'* - over time.

4.D.3. The Social Organisation of Space

Translated into the environmental situation, human societies build their spatial environment in order to construct a spatial structure. The most fundamental properties of cities are their ordering of space into programmed systems with shifting relations in time and space for embodying social purposes. Thus a city is, after all, so much more than a material artefact. It is **social relations**, **psychological states**, and **cultural milieux** and **its material form is an epiphenomenon**, or **a by product of these dynamic processes** (Hillier, 1989). The spatial and functional complexity (i.e. structural and functional hierarchies) of cities, suggests that **the spatial form of cities is programmed itself** and **can be replaced by a de-spatialized network of communications and transactions**. In fact **an ordered spatial milieu is a constructed spatial structure**. It produces and reproduces not only ***actual*** social relations but also ***the principles for ordering social relations*** (Hillier, 1989). **This is because of the fact that a spatial milieu not only represents itself as a physical hierarchicy of symbols** (i.e. structural hierarchy) **but also it is used sometimes to generate and sometimes to restrict the *field of encounter* of human beings and their symbols** (i.e. functional hierarchy). **Hence space is not simply a *function* of the principles of the social reorganization but an intrinsic aspect of it, a necessary part of the social *programming***. It seems highly likely that the best key to the ***spatial structure*** of the city might be the generative rules underlying the material form, rather than simply the form itself.

4.D.3.1. The Study of Space

Therefore, while there is no doubt that cities do express *social meaning* through their *appearances*, the reason that this line of work cannot provide our starting point appears more fundamental. This opens up the oportunity to review the ways we may study the space. Some examples are as following:

4.D.3.1.1. Space, and Artefacts

When we are talking about spatial elements, built forms may be comparable to other artefacts in that they assemble elements into a physical object with a certain form; but they are incomparable in that they also create and order the empty volumes of space resulting from that object into a pattern. It means, built forms appear to be physical artefacts, like any other, and to follow the same type of logic. But, as it is expressed by Hillier et al. (1984), this is illusory: "Encipher as they are purposeful, they are not just objects, but transformation of space through objects. It is the fact of space that creates the special relation between function and social meaning" (p. 1). Because *function* as *social meaning* is actually crystallised or experienced in space over time. Therefore, the ordering of space in built forms is really about the ordering of relations between people: "Architecture is not a 'social art' simply because buildings are important visual symbols of society, but also because, through the ways in which buildings, individually and collectively, create and order space, we are able to recognise society: that it exists and has a certain form" (Ibid.).

4.D.3.1.2. Space, and Relational Systems

It is also argued by Hillier et al. (1984) that it seems to be a characteristic of the human mind that it is extremely good at using relational systems. All languages and symbolic systems are at least complex relational systems. But, **relations**, however seems, "**are what we think with, rather than what we think of**" (p. 2). So it is with built forms. Their most fundamental properties are their **ordering of space** into **relational systems** embodying **social purposes**.

But, it has been eventually easier to talk about appearances and styles of individual buildings and elements and to try to manufacture a socially relevant discourse out of surface properties,

rather than to talk about built forms in terms of what they really are 'socially purposeful' and 'spatially relational'. Actually when space does feature in built form criticism, it is usually at the level of the surfaces that define the space, rather than in terms of the social space itself; and when it is about social space, it is usually at the level of the individual space rather than at the level of the system of spatial relations that constitute the settlement. Those dimensions of the built forms that are not immediately co-present with the observer at the time that s/he formulates his or her comment are lost to discourse.

4.D.3.1.3. Space, and By-Products

Within a fairly restricted region with relatively small variations in climate, topography and technology, there are very wide variations in architectural and spatial form. But within the same ecological area are similarities which jump across time and space. Taking the body of evidence as a whole, therefore, it seems impossible to follow the common practice when faced with an individual case of assuming architectural and spatial form to be only a by-product of some extraneous determinative factor, such as climate, topography, technology or ecology. At the very least, space seems to defy explanation in terms of simple external causes.

Aware of these difficulties, certain 'structural' anthropologists have suggested another approach. Levi-Strauss[2] (1967) for example, saw in space the opportunity to "study social and mental processes through objective and crystallised external projections of them" (p. 285). He had already noted in reviewing the evidence relating social structure to spatial configuration that "... among numerous peoples it would be extremely difficult to discover any such relations.... While among others (who must therefore have something in common) the existence of relation is evident, though unclear, and in a third group spatial configuration seems to be almost a projective representation of the social structure" (Ibid.). However, in this relation Hillier et al. (1984) note:

> "In studying space as an 'external projection' of 'social and mental processes' which by implication can be described prior to and independent of their spatial dimension, it is

[2] Levi Strauss, Claude, 1967, *Structural Anthropology*, vol. 1, Anchor Books, Garden City, New York, p. 285).

clear that structural anthropologists are therefore studying the problem of space neither as a whole nor in itself: the first because they are concerned chiefly with the limited number of cases where order in space can be identified as the imprint of the conceptual organisation of society within the spatial configuration[3]; the second because they still see space as a by-product of something else whose existence is anterior to that of space and determinative of it" (p. 5).

They further more explain that by clear implication this denies to space exactly that descriptive autonomy that structuralist anthropology has sough to impart to other pattern - forming dimensions of society - kinship systems, mythologies and so on. Such studies can therefore contribute to the development of a theory of space, but they are too partisan to be its foundation. They express, therefore, "we must take care not to reduce space to being only a by-product of external causative agencies". However, they specify certain requirements of a theory of space as follow: "First, it must establish for space a descriptive autonomy, in the sense that spatial patterns must be described and analysed in their own terms prior to any assumption of a determinative subservience to other variables; second, it must account for wide and fundamental variations in morphological type, from very closed to very open patterns, from hierarchical to non-hierarchical, from dispersed to compressed, and so on; and third, it must account for basic differences in the ways in which space fits into the rest of the social system" (Ibid.).

But, the main duty of this study is to mention that **prior to a *descriptive image* or a *descriptive requirements* of a theory of space, there is a need for a such theory to have a more *conceptual* attitude towards its components**. In other words, **the main question would be what *function* really space have. Or what function is embedded in space which gives *unity* and *identity* to its components as *time* passes**. Therefore, the question wouldn't be what has produced the space, or what its structure is? But, in contrast, how the structure

[3] Hillier et al. mention that some societies appear to invest much more in the physical patterning of space than others, while others have only seemingly informed and 'organic' patterns, while others have clear global, even geometric forms; and some societies built a good deal of social significance into spatial form by, for example, linking particular clans to particular locations, while others have recognisable spatialforms, but lack of any obvious investment of social significance (Hillier, B., and Hanson, J., 1984, p. 5).

of space does operate, or what its function is? Hence, not only the theory needs a *descriptive image* but also a *conceptual function* or a *conceptual explanation*.

4.D.3.1.4. Space, and Objects

In fact, some approaches to the problem of space are distinguishable as being concerned initially with the environment as an **object** rather than with the **human subject**, in the sense that the focus of research shifts to the problem of describing the physical environment, and its differences and similarities from one place or time to another, as a prelude to an understanding of how this relates to patterns of use and social activity (Hillier et al., 1984).

It seems, however, there is a need for some works to bring a range of studies with the central thematic aim of going beyond the more traditional classification approaches of geographers to urban morphology into an analysis of how differences in the organisation of architectural and urban space relate to and influence social life (Ibid.). The general aim is to describe how environments acquire their form and order as a result of a social process. The aim is to show how order in space originates in social life, and therefore to pinpoint the ways in which society already pervades those patterns of space that need to be described and analysed.

4.D.3.1.5. Space, and Systems of Appearance

Therefore, counterpointing the approach to an objective environment, in itself devoid of social content, is the approach of the architectural and urban semiologists who aim to describe the environment solely in terms of **its power to operate as a system of signs and symbols**. By developing models largely out of natural language studies, the object of these researches is to show how the physical environment can express social meaning by acting as a system of signs in much the same sort of way as natural language. In this sense, it is the study of the systematics of appearances. In this relation Hillier et al. (1984) argue: "The semiologists for the most part are attempting to show how buildings represent society as signs and symbols, not how they help to constitute it through the way in which the configuration of buildings organise space. They are in effect dealing with **social meaning as something which is added to the surface appearance of an object, rather than something that structures its very form**" (p. 8).

In this sense, therefore, the city is being treated as though it were no different from other artefacts. The semiologists do not in general try to deal with the special problems that cities present in understanding their relation to society: they try to fit urban design into the general field of artefact semiotics.

4.D.3.1.6. Space, and Systems of Constitution of Order

In spite of considerable divergences, these approaches all seem to sidestep the central problem of built form. They do not first conceptualise built forms as carrying social determination through their very form as objects. They characteristically proceed by separating out the problem in two ways: (1) They separate out the problem of meaning from the intrinsic material nature of the artefact, that is, they treat it as an ordinary artefact rather than as a buillt form. As mentioned before, 'meaning' is involved in the intrinsic material nature of the *symbolic spatial artefact* and is not separable from it. Because 'spatial meaning' itself generates a hierarchical organization of three dimensional synchronous space for embodying social purposes: it is itself for embodying concrete/social examination of such meanings which need to be expressed by some material artifacts other than space such as signs and symbols. And, (2) they separate out a human subject from an environmental object and identify the problem as one of understanding a relation between human beings and their built environment. The effect of both shifts is the same: They move us from a problem definition in which a built form is an object whose spatial ordering with the implication that social ordering already has itself a certain spatial logic to it, into one in which the physical environment has no social content and society has no spatial content, the former being reduced to mere inert material, the latter to mere abstraction. This is what is called by Hillier et al. (1973) the *man-environment* paradigm.

An impossible problem is thus set up, that of finding a relation between abstract immaterial 'subjects' and a material world of 'objects'. By the assumption that what is to be sought is a relation between the 'social' subject (whether individual or group) and the 'spatial' object acting as distinct entities, space is desocialised at the same time as society is despatialised. This misrepresents the problem at a very deep level, since it makes unavailable the most fundamental fact of space that **the man-made physical world is already a meaningful**

social behaviour. It **constitutes** and **reconstitutes** - not merely represents - a form of order in itself: "one which is created for social purposes, whether by design or accumulatively, and through which society is both constrained and recognisable" (Hillier et al., 1984, p. 9).

The study proposes that the theory needs to be aware of two facts. First, the constitution of order operates at two levels: **the level of concrete** (i.e. the process of practice), and **the level of abstract** (i.e. the process of inducting). It introduces not only **the creative process of pursuing purposes** in *three dimensional synchronous space* but also **the directive process of inducing ideals** in *space-time dimension*. In other words, it is not only a **creative process** *constrained by past achievements* but also a **directive process** *traced by perfect ideals*. The first constitudes **the continuty of creative progress** and the second **the direction of perfect progress**. The first looks at **the past structure** and the second to **the future ideals** (Figure 4.28).

The Process of Concrete Practice
'The Creative Process of Pursuing Purposes'
(Three Dimensional Synchronous Space)

The Process of Abstract Induction
'The Directive Process of Inducing Ideals'
(Space-Time Dimension)

Figure (4.28) Levels of Continuity (Source: The Author)

Second, the constitution of order also operates at another two levels: **the level of self-consciousness** (i.e. the level of system of 'physical appearance' or 'spatial structure' - structural hierarchy in terms of which features of presence it might let through) and **the level of self-ideality'** (i.e. the level of system of 'social practice' or 'social structure' - functional hierarchy in terms of how it is confined) (Figure 4.29).

The Process of Creating Self-Conscious System of Physical Appearance
'The Directive Process of Inducing Ideal Spatial Structure'
(Space-Time Dimension)

The Process of Creating Self-Ideal System of Social Practice
'The Directive Process of Inducing Ideal Social Structure'
(Space-Time Dimension)

Figure (4.29) Levels of Abstraction (Source: The Author)

4.D.3.2. The Function-Modelling of Process in the Organization of Space

The topic of this study is *centrality in the structure of built environment*, and the subject to emphasize is the *structural transformation of society and space*. For getting insight the complexity of the meaning of centrality, the author insisted on that alternative picture of the world of nature which believes on **process** that **any changes we notice are not secondary**, **arising from the 'interaction of elements'**, but, **they are elementary which organize the 'relations between elements'**. By now, the study mostly focused on how the order of this organization in living complex systems emerges from the *centre* or the *structure*. Now, it is time to conclude how the order of this organization according to built complex systems is also affected by its centre.

Actually the problem starts when looking at the structure of a built system it is usually common to see it in a descriptive way rather than explanatory one, and even in an explanatory way it is usually more common to see it in the mode of 'what produced it' rather than 'what its function is' (see Chapter 1 on descriptive images and explanatory concepts). Here, the author would like to explain the function-modelling of the structure of a built system which provides us the simulative approach of the process of change in living complex urban systems.

As we noticed before, there are two kinds of group systems: 'concrete' and 'abstract', which in concrete systems there are also two categories: 'non-living' and 'living' systems. In non-living systems we are concerned with the structure of systems in which, although things are going on, the system itself remains the same as time passes, and in living systems, the structure of systems which alter with the lapse of time. Here, the main point to emphasize is that in our case, i.e. the function-modelling of the process of change in the organization of space, it is usually common to see a built form as a non-living system: sometimes in a *static* level, structural hierarchy of frameworks; sometimes in a *dynamic* level, laws of mechanics of clockworks; and sometimes in a *homeostatic* level, feedback and information theory of cybernetics (see Figure 4.30).

But, if we move up towards the level of living systems, the first thing which comes to our

mind is 'genetic structure'. Actually in the level of living organisms or **self-maintenance systems** the basic problem is the relation between *structure* and *function*. That from *structure* alone (i.e. structural hierarchy) one cannot make deductions about *form* or *function* (i.e. functional hierarchy). One must add to structure a *principle of organization* which evolves in time and constantly produces an organizational hierarchy of systems of reproduction across space and time. It means, function is a process in time and for a living systems the appearance of time-dependent function is the essential characteristic of its hierarchical organization. It means that not only we need *transmissible information* but also *transmissible instructions* or *programmes*. But, however, the main point to emphasize is that in living organism processes this *transmissible information* is 'fixed' itself, and as a result therefore its function is also a ***pre-programmed organizational process*** in time.

But, as we move upward from the plant world towards the animal kingdom we gradually pass over into the level of **self-awareness** in which the teleological behaviour is not only response to a specific stimulus but to an 'image' or a 'close-ended knowledge structure'. Here, in this level, function is an ***autonomous organizational process*** in time. But, moreover, man possesses **self consciousness** whose image has a ***self-reflexive quality of organizational process*** in time which is bound up with the phenomenon of language and symbolism. It means, in this level we are concerned with the meaning of the message. Knowledge, however, grows by the receipt of meaningful information and this is the whole point of this level that human knowledge is itself an ***open-ended organizational process***. It is unlike the embryo which reaches a terminal state in the adult form, or it is unlike the animal which reaches a terminal state of knowledge in his final state of consciousness (see Figure 4.30).

Also, in addition, man is an example of **ideal-seeking systems** who has a concept of perfection or ultimately desirable. He pursues his open-ended ideal perfection in a systematical ***purposeful organizational process*** in time, and it is in this process concerning society as well that the unit of social system is not the individual human but - the *'role'* - that part of the person which is concerned with the organization. These roles create relational systems consist of 'individuals' and 'relations' which create also examples of **symbolic systems** consist of 'elements' and 'assumptions' such as: philosophic systems, languages, arts, and spatial systems.

These are all abstract systems which need to be examined in *concrete systems* or the same in *spatial built systems*. It is only with such systems that we are concerned here and this is the whole point of abstract systems that one need to see the *time-space relations inherent in the constitution of all social interaction*. The product of the process is either a conclusion that is believed and hence becomes a basis for selecting a course of action, or a conclusion that can be tested, tried, observed, and evaluated. It defines that mental transformation is potentially unending, and new dialectical tensions constantly arises from previous resolutions.

CONCRETE SYSTEMS

Non-Living Systems

Systems in which, although things are going on, the system itself remains the same as time passes.

System	Level	Structural Hierarchy	FunctionaHierarchy
Static	Geography&Anatomy	Structural Hierarchy	Framework
Dynamic	Motion	Laws of Mechanics	Clockwork
Homeostatic	Control Mechanism	Feedback & Information Theory	Cybernetic

Living Systems

Systems which alter with the lapse of time

System	Level	Structural Hierarchy	FunctionaHierarchy
Self-Maintenance	Self-Reproducing	Fixed Genetic	Pre-Programmed
Self-Aware	Teleology	Fixed Knowledge	Autonomous
Self-Conscious	Meaning	Open-Ended Symbolic	Self-Reflexive
Self-Ideal	Desire	Open-Ended Social	Purposeful

ABSTRACT SYSTEMS

System	Level	Structural hierarchy	FunctionaHierarchy
Symbolic	Thought	Open-Ended Rules of Game	Formulation & Evaluation of Choices

Philosophic Systems, Symbolic Systems, Languages, ...

Systems which are the **function** of the principles of the **social reorganization**.

Spatial Built Systems

System which is not only a **function** of the principles of the social reorganization but it is an **intrinsic** aspect of it, a necessary part of the **social programming**.

Figure (4.30) Simulative Model: The Function-Modelling of the Process in the Orgnization of Space (Source: The Author)

It is defined that any **social system** as a programmed activity with shifting relations in time and space. Its function is a process in time, and for a social system the appearance of time-dependent function is the essential characteristic of its hierarchical organization. It is, therefore, worthwhile to emphasize difference between living organism processes and the process of human thought: unlike the emergence of order in living organisms that there are first ***fixed rules*** **of genetic structure** and then ***pre-programmed process*** **of interaction of elements**, in the emergence of artificial order in thought there are first ***open-ended creative process of formulation and evaluation*** **of different choices** and then ***open-ended inductive process of generation*** **of rules of symbolic structure**. In other words the process is reverse (see Figure 4.31).

Living Organisms

1) *'Fixed Rules* of Genetic Structure'
(Space-Time Dimension)

2) *'Pre-Programmed Process* of Interaction of Elements'
(Three Dimensional Synchronous Space)

Human Thought

1) *'Open-Ended Creative Process of Formulation and Evaluation* of Different Choices'
(Three Dimensional Synchronous Space)

2) *'Open-Ended Inductive Process of Generation of Rules* of Symbolic Structure'
(Space-Time Dimension)

Figure (4.31) The Difference between Living Organism Process and the Process of Human Thought (Source: The Author)

There are therefore two kinds of processes involved with each other: in **concrete level**, there are first **purposeful relations of individuals' actions** and then **generation of rules of social structure**; and in **abstract level**, there are first the **process of formulation and evaluation of choices for transferring more useful information** and then **generation of rules of symbolic structure**. They altogether create the structure of thought of the society (Barghjelveh, 1996). It means all societies are free in creating this structure which it is itself open ended (see Figure 4.32).

Concrete Level

1) 'Self-Ideal Process of Pursuing Purposeful Relations'
(Three Dimensional Synchronous Space)

2) 'Self-Ideal Inductive Process of Generation of Rules of Social Structure'
(Space-Time Dimension)

Abstract Level

1) 'Self-Conscious Process of Formulation and Evaluation of Choices for Transferring more Useful Information'
(Three Dimensional Synchronous Space)

2) 'Self-Conscious Inductive Process of Generation of Rules of Symbolic Structure'
(Space-Time Dimension)

Figure (4.32) The Difference between Concrete Level and Abstract Level (Source: The Author)

But, as we noticed before, not all relational systems of abstract kind are the same; some are systems which are the **function** of the principles of the **social reorganization** such as: 'philosophic systems', 'arts', 'languages', etc; and the only one, '*space*', which is not only a **function** of the principles of the social reorganization but an **intrinsic** aspect of it, a necessary part of the **social programming**. In fact, before the process of formulation and evaluation of different choices for transferring more useful and meaningful information in different abstract levels, there are first the process of pursuing purposeful relations in concrete level. As space is itself organised as a concrete system, therefore, it becomes an intrinsic aspect of social programming (or social reproducing). And, this is the whole point that one need to see the space-time relations inherent in the constitution of all social interactions (see Figure 4.33).

Abstract Systems

Systems which alter with lapse of time

1) **Philosophic Systems, Symbolic Systems, Languages, etc.** systems which are the **function** of the principles of the **social reorganization**.

2) **Spatial Built Systems** the only systems which are not only a **function** of the principles of the social reorganization but they are an **intrinsic** aspect of it, a necessary part of the **social programming**.

Figure (4.33) Kinds of Abstract Systems (Source: The Author)

Now the simulative model is not only concerned with **descriptive image** to individuate the structure of a built system - i.e. to describe '*what shape a spatial structure has*', or with **explanatory concept** only to understand the strucutre of a built system in terms of '*what produced a spatial structure*' or '*how spatial structure comes to be*', but also with that **explanatory concept** to determine '*what function a spatial structure has*' or '*how a spatial structure does operate*'. Now the answer is not only a descriptive model, but an explanatory one.

Hence it is the main point of the model that space does operate at two levels. In other words, its function has two kinds of processes: 'purposeful' and 'self-reflexive'. In 'purposeful' process it is concerned with self-ideal principles of social reorganization in terms of how it is confined across space and time. **Its function therefore is a necessary part of social programming and an intrinsic aspect of it**. But, in contrast, in 'self-reflexive process' it is concerned with self-conscious principles of transferring more useful information in terms of which features of presence it might 'let through'. This time, **it is the function of the principles of social reorganization** (see Figure 4.34).

Self-Ideal/Purposeful Process

'Space Functions as an Intrinsic Aspect of Social Programming'

'Reorganization of Social Practices for Generating Rules of Social Programming **(Principles of Social Structure)**

Self-Conscious/Reflexive Process

'Space is the Function of the Principles of Social Programming'

'Reorganization of Spatial Elements for Generating Rules of Spatial Programming for Transferring more Useful Information' **(Principles of Spatial Structure)**

Figure (4.34) Levels of the Process of Space (Source: The Author)

In both levels, space does not only operate on creativity received by past social achievements but also with directiveness to coming perfect social ideals. It is in fact the progressive individualization resulting from progressive centralization that certain parts

gain a dominant role and so determining the behaviour of the whole. This individualization does operate at two levels, directing both elements and individuals to the directiveness of both self-conscious and self-ideal processes in space-time dimension. It is recognized, therefore, that the comparison between living organism processes and the process of human thought can be figured out as Figure (4.35):

The Emergence of Order in Living Organisms

Self-Maintenance Systems

1) Fixed Genetic Structure (Over Time)
2) Pre-Programmed Interaction of Elements (Time-Dependent)

The Emergence of Artificial Order in HumanThought

Process of Inputs, Process, and Outputs

Inputs: Perception, Consciousness, Memory
Process: Modelling the Situation: Beliefs
Evaluating the Situation: Feeling & Attitudes
Outputs: Formulation and Evaluation of Choices: Thought

Symbolic Systems

1) Formulation & Evaluation of Choices (Time-Dependent)
2) Open-Ended Generation of Rules of Games - Structural Rules (Over Time)

a) Self-Ideal

1) Purposeful Process of Pursuing Social Relations (Time-Dependent)
2) Open-Ended Generation of Social Structure (Over Time)

b) Self-Conscious

1) Self-Reflexive Process of Transmission of Meaningful Information (Time-Dependent)
2) Open-Ended Generation of Symbolic Structure

Figure (4.35) The Comparison between the Emergence of Order in Living Organism Processes and the Emergence of Order in Human Thought (Source: The Author)

4.D.4. Symbolic Principles and Instrumental Principles of the Organisation of Space

Patton (1978) distinguishes that there is a distinction between two kinds of programme goals: "Some programme goals symbolize the very values and principles of a society. Such goals are ideals to strive for because they present basic notions of what is good and right. These goals are ends in themselves." **As the study proposes this kind of programme goals are related to the open-ended generation of symbolic/social structure of thought over time**. But "the second category of goals are more *instructional* in nature. These present a means of attaining more basic ideals. These goals represent the methods by which higher level ideals are to be achieved" (Ibid.). **This kind of programme goals are also related to the open-ended generation of self-ideal process of pursuing purposeful social relations via the open-ended generation of self-conscious process of transmitting meaningful information in time-dependent spatial occasion. Since in the case of the emergence of artificial order in human thought there are in the first place the second category of programme goals i.e. the hierarchical organization of purposeful social relations across space and time, it is therefore the importance of this point that how societies could possibly organize the means and methodes of the attaining more basic ideals**. In fact, **the question is what kind of means and methods as *instructional* programmes may symbolize the very values and principles of a society. Is it symbolic or instrumental**?

In the case of our concern, therefore, is it that kind of social programming of space which **plays a largely instrumental role** or the one which **appears to be organized more to show relations of symbolic importance**? Carry (1993) notes about Abelson et al. (1990) who differentiate the instrumental functional purpose of beliefs and attitudes from symbolic purposes, the latter requiring only a tenuous connection with reality. He says: "Symbolic beliefs and attitudes are often based on what the belief or attitude objects represent for individuals' identity and values. The symbolic functions may provide social identification or a self-expressive value function. In contrast, the instrumental function of beliefs contains what Smith et al. (1956) called 'object appraisal' for classifying objects and structuring the environment to maximize one's own interests" (p. 556) or even structuring the environment in the way of achieving maximum instrumental interest of it - author's emphasis.

To accept the nature of symbolic beliefs, it is necessary to keep in mind the use of symbols and symbolism in social discourse. A symbol is a concrete representation of some other entity that is often more abstract. The simplest form of symbol is a *sign* revealing a one-to-one relationship - for example, a mathematical symbol. But symbols frequently reflect a one-to-many relationship (Royce, 1965). The relation of a symbol to an object is so based on convention rather than on a qualitative or physical resemblance. The image of St. Peter's can be simply an image of St. Peter's; however, it may suggest Rome or the Catholic Church, thus becoming symbolic of something more than its own reality (Gibson, 1966). In the most basic sense, therefore, symbols with shared meanings provide the basis of human communication. Meanings may be denotative, in the sense of a concrete relationship between a symbol and an object, or connotative, reflecting a more subjective, implied meaning (see also Chapter 4 Section C on the process of thought).

Hence, it is necessary to maintain that in a psychological sense, symbolizing provides individuals with the ability to process and transform transient experiences into internal models allowing abstract thought processes (Csikszentmihalyi et al., 1981). **It is related to the open-ended generation of symbolic structure of thought over time**. And, also it is in a cultural sense that symbols allow individuals to convey feelings and attitudes that have an objective existence outside immediate situations (Ibid.). **This is also related to the open-ended generation of self-ideal process of pursuing purposeful social relations via the open-ended generation of self-conscious process of transmitting meaningful information in time-dependent spatial occasion**.

The symbolic versus instrumental function distinction resides not only in individuals but also in belief or attitude objects. For example, an air conditioner is an object that engages primarily a utilitarian attitude function because one's beliefs about it are based largely on the benefits and costs that are intrinsically associated with it. A wedding ring is an object that primarily engages social identity function because attitudes toward it are based largely on what it symbolizes (Shavitt, 1990). Some objects may be associated with both instrumental and symbolic functions that vary with individuals or context. A tree, signified as a cedar on a flag, symbolizes Lebanese patriotism. For a forester, a tree connotes utilitarian functions of wood

harvesting; for an 'environmentalist', a rain-forest tree symbolizes societal threats to forest ecosystems. **In architecture also, in addition to utilitarian functions, people may inter emotional and other qualities from architectural styles that reflect symbolic meanings** (Nasar, 1989). In such cases, a symbolic meaning arises from "**a cognitive process whereby an object acquires a connotation beyond its instrumental use**" (Lang, 1987, p. 204). In fact, **symbolic beliefs have the potential to produce metaeffects by giving expression to personal and social identity that eventually may be signified in social norms. Such norms could be harnessed to bring about environmental behaviour that may be at odds with individual instrumental purposes** or even **with purposes which maximize the instrumrntal interest of environment**.

But, the problem has started when instrumental beliefs related to the environment have been likely to be more powerful than symbolic beliefs in influencing environmental discipline. In fact there is a tendency to assume that ***instrumental principles of individual programming*** or ***principles of maximizing instrumental interest of environment*** **can yield structural programming**. But, these are not the same thing at all. **We learn to read structure over time**. And, that is the reason why **a highly-instrumental design programme may in fact be unstructured when we experience it as a built form**, whereas, **a structured space layout programme may turn out to be intelligible to its users**.

In this tendency there is usually a confusion between the order of structural programming and the order of instrumental programming of spatial patterning. As an example, therefore, modern technology has been instrumental in imposing the modernist paradigm upon the ways of different *social* and *spatial* cultures. In a sense, it has been an attempt to unify the idea of separate groups under one theoretical umbrella. But, according to the structural programming of built forms, the priority is not only to habilitate a set of activities, but, most importantly, the structural programming of society and space which persists in a very core structure.

The production of spatial meaning only arises purposively and operates at two levels: the *parts* and the relations between parts, the *whole*. It is in the latter that a further characteristic of spatial design is to be found (King, 1988, p. 460). Also Castells (1977) elaborates this

relational aspects by distinguishing between: "(1) the effects of conjuncture, that is to say, already existing urban forms, the accumulated and socially combined historical product, and (2) the symbolic charge proper to spatial forms, not in accordance with their place in the urban structure, but with their place in the cultural history of forms" (p. 219). So, urban design is crucially concerned with these relational and contextual dimensions of spatial forms, either in the design of parts, or in the coordination or design of whole.

It means that the retention of the shape does not amount to the retention of all relations, or preservation of the shape itself, is not enough to preserve identity. What has to be preserved is not only a set of facades or a set of cityscapes, but most importantly, it is the link between parts and whole, local and global, or meaning and social practice. This relates to the "fundamentally recursive character of social life, and expresses the mutual dependence of structure and agency" (Giddens, 1979, p. 69); that the structural properties of socio-spatial systems are both the medium and the outcome of the practices that constitute those systems. **All social actors have some discursive penetration of the socio-spatial systems to whose reproduction they contribute in their socio-spatial practices. Thus these practices reconstitutive of prevailing structures, and respective to dominant ideals, are always possible - given requisite degrees of penetration both of the unacknowledged conditions and of the unintended consequences of action.**

Then, how does it work in such a design in terms of the instrumental attempt - the analytic approach of Modernist thought of design for instance - to break complex urban situations in order to simplify them, when in reality they are not really simplifiable. The analytical approach which suggests that if something is very complicated you should break it down into small sub-problems, sufficiently simple to be resolved separately. It is the main characteristic of instrumental principals of spatial programming which do not usually see the structural relations of the both parts and assumptions in such a structural approaches.

The idea of the interrelationship between man and environment, for instance, seems so obvious that it is not easy to insist on the dominance of the concept over the observation. This is certainly the conclusion of Lowenthal et al. (1972) who say: "Judgements about places may

be based rather on specific or experiential preconceptions than on objective observations and comparisons. This is not new discovery but our data indicate that the effect is far greater than is commonly realised" (p. 45). Or as Durkheim was on the track of this idea in 1915: "... a society is not made up merely of the mass of individuals who compose it, the ground they occupy, the things which they use and the movements which they perform but above all is the idea which it forms of itself" (p. 422).

4.D.5. The Organization of Space in City Centres

Now, about the organization of space in city centres this is not to say that 'seeing is believing' is replaced by 'believing in a centre is seeing a centre'[4], nor that behaviour takes place in a centres-peripheries environment, but rather that environment is an integral part of behaviour (Proshansky et al., 1970, pp. 102 and 278). "**Centres of cities do not channel our thoughts into a diagonalism between centres and peripheries, but our ideas about centres channels us into thinking about city scenes in this way**" (Bird, 1977, p. 137). City centres, even if rarely visited, are nevertheless 'there' as psychological points of reference (Neyret, 1970, p. 39). We are also aware that the city is more than we see and enshrines values that we need. Hudnut (1949) has argued somewhat along these lines: "Beneath the visible city laid out in patterns of streets and houses there lies an invisible city laid out in patterns of idea and behaviour which channels the citizen with silent persistent pressure and, beneath the confusion, noise, and struggle of the material and visible city, makes itself known and reconciles us to all of these" (p. 160).

Hypothesis

Centre serves as a witness to past achievements and also as a promise for new ones to come. It seems it is not enough for our centres only to order a highly-instrumental design programme of a spatial patterning of centre instead of the mechanism of centralizing the subject's thought. Of course, centre has a potential to transfer the structure of the thought of the society over

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[4] In terms of relation between concept and percept, as Bird (1977, p. 138) has noted, 'seeing is believing' is a **problem-oriented** type of planning philosophy whereas 'believing is seeing' is a **goal-oriented** one. 'Natural cities' or cities of heterogenetic change are examples of the problem-oriented philosophy and 'artificial cities' or cities of orthogenetic change examples of the goal-oriented one.

time, but transformation takes place when centralization takes place, and this involves both the elements and assumptions or both the elements and relations. Only structural programmes show how the elements are related to each other and hence to the function. If the relations were ignored the autonomous structure will die. The advantage of expanding and contracting of the individuals' experiences is to see the parts both in a whole individually and as a whole with each other.

Therefore, lack of appropriate spaces and their compatible usages causes improper social ambitious on developing and evaluating the structure of socio-spatial systems. The main effect of this is that people face problem in structuring their socio-spatial systems, and this comes from unstructured changes which occur in their environment. The main role of the city centre is that it is itself the main conditions governing the continuity or transformation of the structure of the society via those socio-spatial systems.

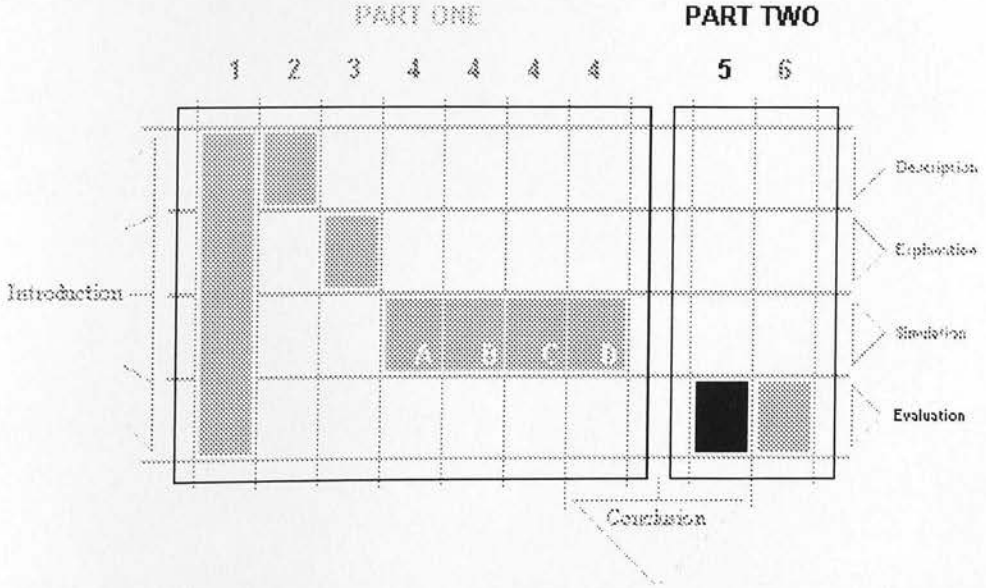
The point is that city improves both symbolic and instrumental principles of spatial patterning parallel to each other and this emerges from the centre itself. The instrumental principles of spatial patterning, the function of every day production and reorganization which is **related to the open-ended generation of self-ideal process of pursuing purposeful social relations via the open-ended generation of self-conscious process of transmitting more meaningful information in time-dependent spatial occasion**, are checked and developed through the symbolic principles of spatial patterning, the function of the social reproduction and programming over time. **This is in fact related to the open-ended generation of spatial symbolic structure of thought over time**. In this concern, therefore, the structuration process takes place only with respect to the ultimate perfection and the ultimate desire of the social programming. It is hence by responding to the structural process of hierarchical mechanism of centralising separate information, it can be asserted to make symbols as a key to the solid articulation of a unity of *self* and *place* and *environment*.

PART TWO

CASE STUDY

CHAPTER FIVE

THE IRANIAN CITY OF MESHED



5

THE IRANIAN CITY OF MESHED

Introduction to Chapter 5

5.1. Urbanization and Urban Change in Iranian Cities

5.1.1. The Pre-Islamic Period (700 BC-AD 644)

5.1.1.1. The Persian Style (700 BC-300 BC)
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Conclusion of the Chapter 5

Introduction to Chapter 5

One of the major issues facing urban developments is the historical study of the city. The Holy city of Meshed is no exception. This city with a population of about two million, is the second largest city of Iran and the capital city of 'khurasan Province'. Because of the Eighth Imam's Tomb, this city is one of the largest Islamic centres in the world which attracts millions of pilgrims every year. Meshed is also an important cultural-religious centre in Central Asia, and as the largest religious city of Iran has deep historical and cultural relations to the other parts of the country. This city, known as the bride of the region, is also one of the most important commercial, employment, administrative and educational centres in Iran.

Meshed as the capital city of the province has experienced many urban developments during various historical periods. This chapter attempts to review the historical change of Iranian cities in general, and the current urban development trends and land use changes within the city of Meshed in particular. Its first section is divided into three parts: the first part discuses briefly the Iranian urbanisation and urban change during the pre-Islamic period; the second part analyses the character of the Isamic cities in general and the character of Iranian structure of the city as response to the Islamic ideals in particular; and, the third part outlines the trends in Iranian urban development and spatial changes in the contemporary time. The second section of the chapter also outlines the character of the changes in the centre of the city of Meshed in the contemporary period. Some conclusions are drawn in the end.

5.1. Urbanization and Urban Change in Iranian Cities

The historical development of Iranian cities can be divided into three main stages. The pre-Islamic period, the Islamic period, and the contemporary period.

5.1.1. The Pre-Islamic Period (700 BC-AD 644)

The pre-Islamic period also can be divided into two main and one middle styles (Habibi, 1991):

1) the Persian Style: the period of the emergence of cities; the gradual growth of urbanization in 'Medes' and 'Achaemenian' times (700-300 BC);

2) the Persian-Hellenic Style: the period of the foundation of self-govern cities as Hellenic cities (city-states) by the Seleucid governors; the rapid growth of urbanization and the flourish of exchange in 'Seleucidian' times (300-200 BC);

3) the Parthian Style: the period of the suppression of self-govern cities; the gradual rule of the central governors over city-states and the foundation of strategic cities; city and society based on caste distinctions in 'Parthian' and 'Sassanian' times (200 BC-AD 644).

Figure (5.1) The Ancient Near East (Source: Cruickshank, 1996)

5.1.1.1. The Persian Style (700-300 BC)

As mentioned before, this style was largely dominated in the gradual growth of urbanization in (a) 'Medes' and (b) 'Achaemenian' times in western Iran:

a) During the 'Medes' period, 'urbanization' was no more than a 'sedentarisation'. Its spatial crystallisation was also no more than a citadel which put dread into the people. Its whole idea was a camp constructed upon a hill with some small dwelling locations around it (Figure 5.2). As Herodotus (1959) writes: The citadel of 'Hamadan' ('Ecbatana') with "its seven mysterious and secret walls" was a scared place where 'Diako', the ruler, lived away from the eyes of people and also foreigners. Such organizations of space was in response to two main principles. First, the principle of security and the constant need to defend in attack situations. In a sense, it was a principle of ideology that for people the citadel was the final and the only definite preserver. And, second, the principle of exploitation or in fact the principle of contradiction of citadel with its surroundings that for the ruler people were also the final and the only agricultural servants based on exploitation manner. In this view, city was always outside the walls, and in the case of danger people were allowed to go to inside the camp.

① **Palace**
② **Stores and Treasury**
③ **Barracks**
④ **Ruler's Relatives' Residence**
⑤ **City**
⑥ **Market Place**
⑦ **Living Locations**

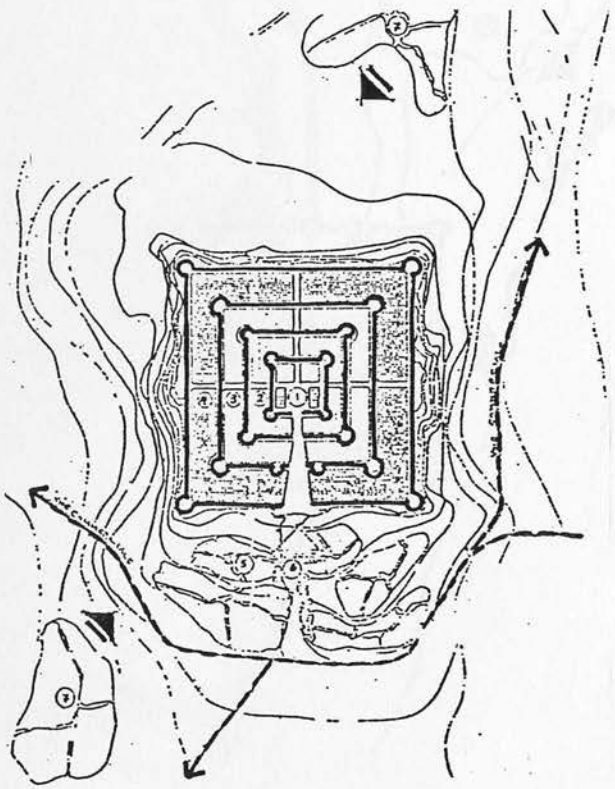


Figure (5.2) Spatial Structure of the City in 'Medes' Times (Source: Habiby, 1991)

b) In the 'Achaemenian' times city had, basically, a military-commercial character in addition to its agricultural one. The invention of coin, the establishment of commercial roads, the development of exchange, and the growth of crafts all facilitated the spatial organization of market place inside the walls. Now, the city was inside the walls. But, for the first time, the initial movement of the spatial organization of settlement based on class distinctions also appeared in this period. Its spatial structure to quote Habibi (1991) consisted of (Figure 5.3):

1) the position of palaces surrounded by the primary massive walls, strategically located in the most secure place;
2) the position of the military equipments, administrative supplies, stores and treasury surrounded by second massive walls around the first;
3) the position of the royal quarters with cultural supplies related to their ceremonies surrounded by the third series of walls; and finally
4) the position of the common quarters and market place surrounded by the final walls.

① **Palace**
② **Barracks**
③ **Stores and Treasury**
④ **Ruler's Relatives' Residence**
⑤ **Main City**
⑥ **Market Place**
⑦ **Village**

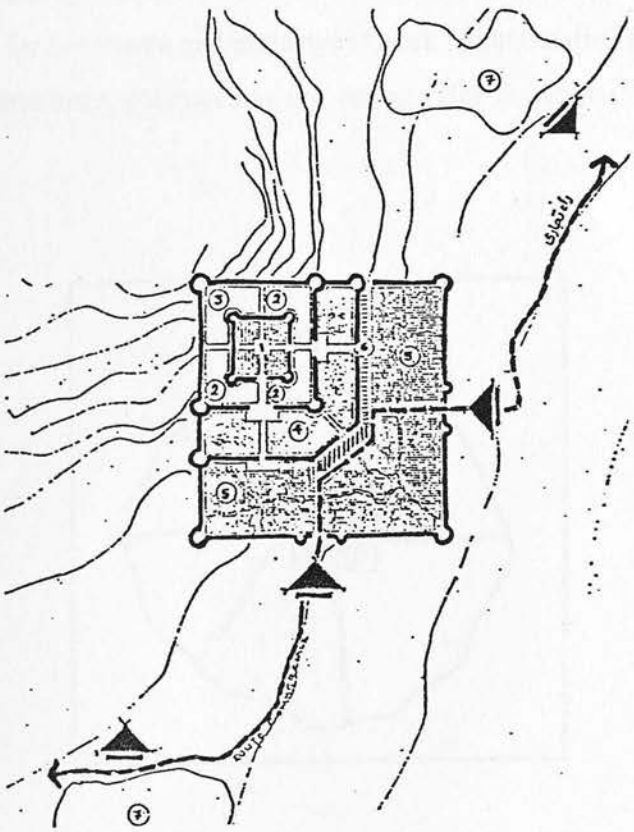


Figure (5.3) Spatial Structure of the City in 'Achaemenian' Times (Source: Habiby, 1991)

5.1.1.2. The Persian-Hellenic Style (300-200 BC)

The period of the foundation of self-governing cities by the Seleucid governors (city-states); the rapid growth of urbanization and the flourishing of exchange in 'Seleucidian' times:

After the arrival of Alexander the Great, during the Seleucid occupation the city became an opportunity for the mixing of two philosophies: east and west. The first based on the founder-family autocracy, and the second based on an aristocracy of nobles. This time, the spatial organization of the city was principally built on 'city-state autonomies' but still under the obedience of the 'central authority'. Hence, by the use of the both 'central government authority' and 'self-authorization of the city' it became possible to govern settlements around the city. The city was based on two positions: the aristocrats (who controlled and ruled the settlements around the city), and the ordinary citizens. They were all surrounded by the city walls (Figure 5.4). But, this time citizens inside the walls had especial privilege or preference in regard to surroundings area. For the first time, there was a square in the middle of the city which held all administrative buildings. It was also the main focus point for many other activities and also a desired place for commerce and exchange (Greek administrative mould). These cities all had their own parliament, parliamentarians, schools (for the young nobles), stadiums and temples (Ibid.).

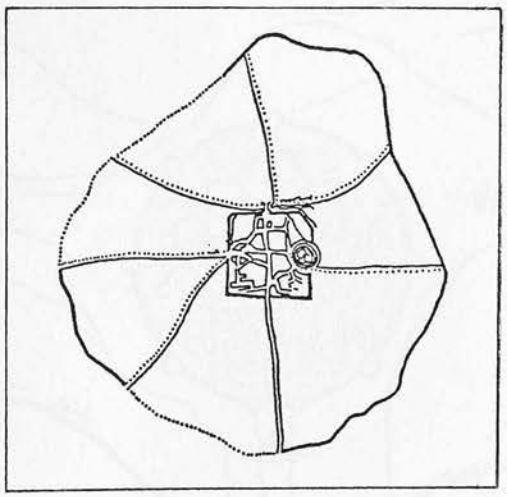


Figure (5.4) Spatial Structure of the City in 'Seleucidian' Times (Source: College, 1967)

5.1.1.3. The Parthian Style (200 BC-AD 644)

The period of the suppression of self-govern cities; the gradual rule of central governors over city-states and the foundation of strategic cities; city and society based on caste distinctions in (a) 'Parthian' and (b) 'Sassanian' times:

a) During the 'Parthian' age (200BC-AD 200), the Hellenistic grid style of design was replaced by the cobweb custom of the 'khurasanian' people. The Parthians who were from 'khurasan' spread this style of design all over the country. They had also inherited their spatial organization of cities from the Achaemenians, based on class distinctions. But, because of (1) the expanded influence of the 'central government authority', expressed in increased growth of exchange and wealth, and also (2) the enormous influence of the 'city-state autonomies' from previous times, expressed in the decreased growth of social distinctions inside the city walls, the spatial differentiation of the city appeared much lighter than in the 'Achaemenian' times. This led the main parts of the city to be positioned as: first, the palace surrounded by massive walls; second, the barracks, stores and treasury with their own walls; third, the ruler's relatives' residence, the civil and government officials' residence and also the clerics' residence all surrounded by their own walls; and finally, the ordinary quarters including the craftsmen and small retail sellers' residence surrounded by the outer walls (Habibi, 1991). It was a circular wall round the city distinct from the Persian-Hellenic style (Figure 5.5).

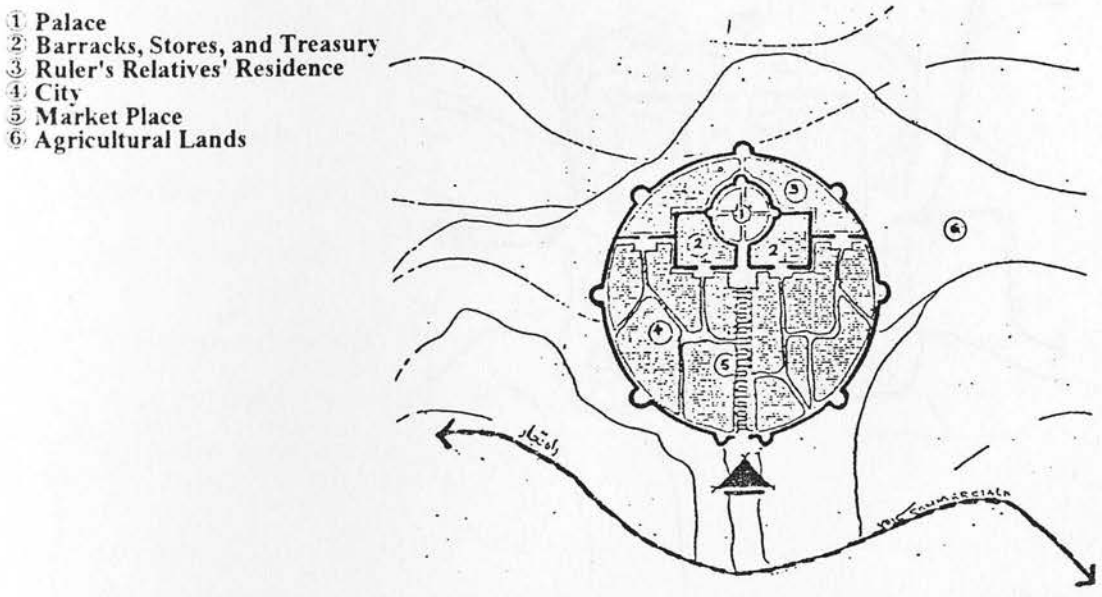


Figure (5.5) Spatial Structure of the City in 'Parthian' Times (Source: Habiby, 1991)

b) During the 'Sassanian' times (AD 200-644), in contrast, the city was again based on a caste organization, but this time a more complete and effective compared to the previous one. It was an absolute autocracy based on class ranking, all located in their own positions inside the city: a citadel with its tall ramparts as the military part of the city surrounded by the ruler's relatives' residences, both together as the main part of the city i.e. the Sharestan; the spatial organization of the market place very similar to our times facing the four city gates (east, west, north, and south directions), sometimes inside the Sharestan's walls and sometimes outside; and finally, the ordinary quarters outside the walls (see Figure 5.6). This time, again, the city was outside the walls. The major spatial figures in this period has been outlined by Habibi (1991) as:

1) "the suppression of self-govern cities and the gradual rule of central governor over city-states;
2) the spatial configuration of market place as the main economic element of the city; and
3) the spatial foundation of society completely based on class distinctions".

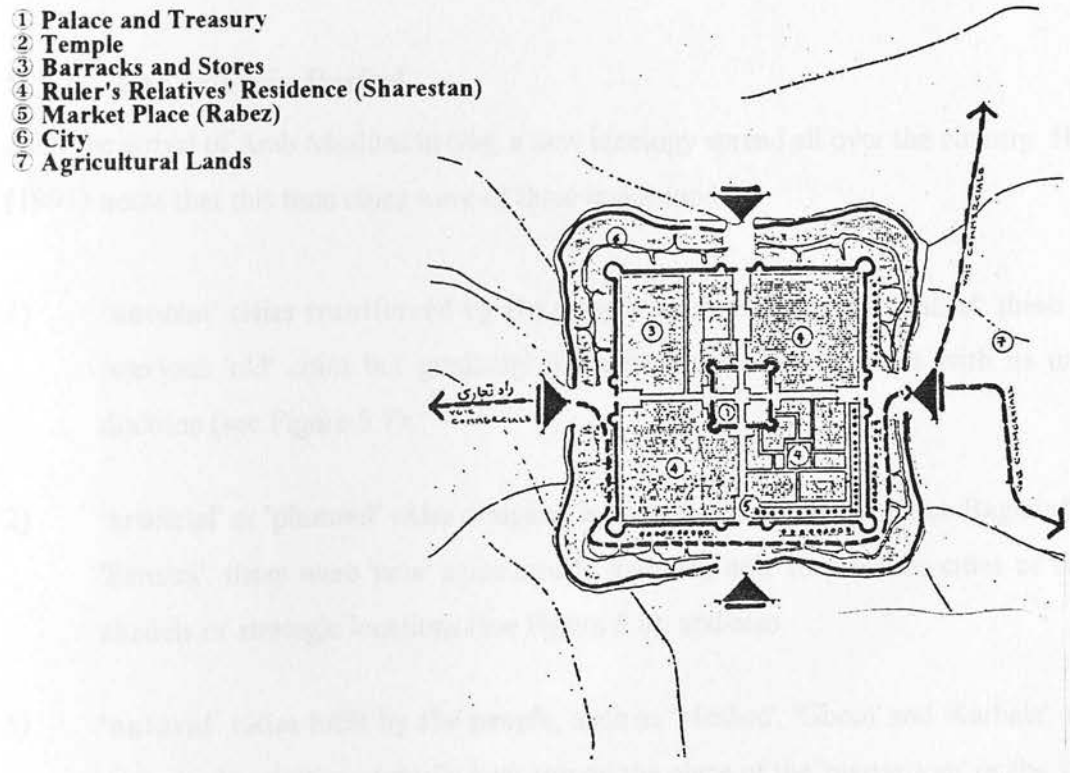


Figure (5.6) Spatial Structure of the City in 'Sassanian' Times (Source: Habiby, 1991)

It is recognizable that in all styles mentioned above the position of the sites for honour and respect, either metaphysical (i.e. temples) or physical (i.e. palaces), have always been inside the walls. As the principal character of the pre-Islamic period they were positioned separately and isolated from living quarters. And, as a result, living quarters were always positioned outside the walls, sometimes surrounded by their own walls and sometimes not. Even in the 'Seleucidian' times, when there were no walls inside the city, the spatial organization of the city was based on two positions: the aristocrats and the ordinary citizens. There were class distinctions and spatial differentiation based on caste separation as there were always a manner of exploitation. Also, another principal point to emphasize is that in this period the both metaphysical and physical potencies of the city were allocated in the hands of one authority, the ruler. Therefore, there was no authority for people to worship or to idealize their own way of life freely and independently.

These aspects all show that the organization of space was imposed by the authorities outside the society. It was, therefore, based on positions rather than relations, or in fact, it was based on power relations rather than social relations.

5.1.2. The Islamic Period

After the arrival of Arab Muslims in 644, a new ideology spread all over the country. Habibi (1991) notes that this time cities were of three major kinds:

1) **'natural' cities transferred by the people**, such as 'Ray' and 'Isfahan': these were previous 'old' cities but gradually *transferred* into Islamic cities with its unique doctrine (see Figure 5.7);

2) **'artificial'** or **'planned' cities designed by Islamic governors**, such as 'Baghdad' and 'Samara': these were 'new' cities mostly designed near to previous cities or beside citadels or strategic locations (see Figure 5.8); and also

3) **'natural' cities built by the people**, such as 'Meshed', 'Ghom' and 'Karbala': these were also 'new' cities gradually *built* around the place of the 'martyrdom' or the 'tomb' of Shiites Imams.

About old 'natural' cities transferred by the people, it has been mentioned that the idea of Islam gradually influenced all aspects of these cities as there were always a defined doctrine based on equality of rights for all citizens. But, about new 'planned' cities there is another point to emphasize. In them, with reference to different periods and different places, there have been different commentaries about the ideology of Islam and its ideal city by different governors. However, among them, new 'natural' cities, mostly built by the people, were usually secure in terms of different interpretations of Islamic ideals. As a result, therefore, they were also secure in terms of different performances of architectural styles or different organization of space authorised and expressed by different governors. As Cruickshank (1996) mentions:

> "Within Islam, however, the variation in styles is distinctive: so much so that to many Muslim scholars the common pattern is blurred to the extent that they deny that there is any such thing as Islamic architecture. These varied styles have evolved around tribal or dynastic foci by which they are known" (p. 561).

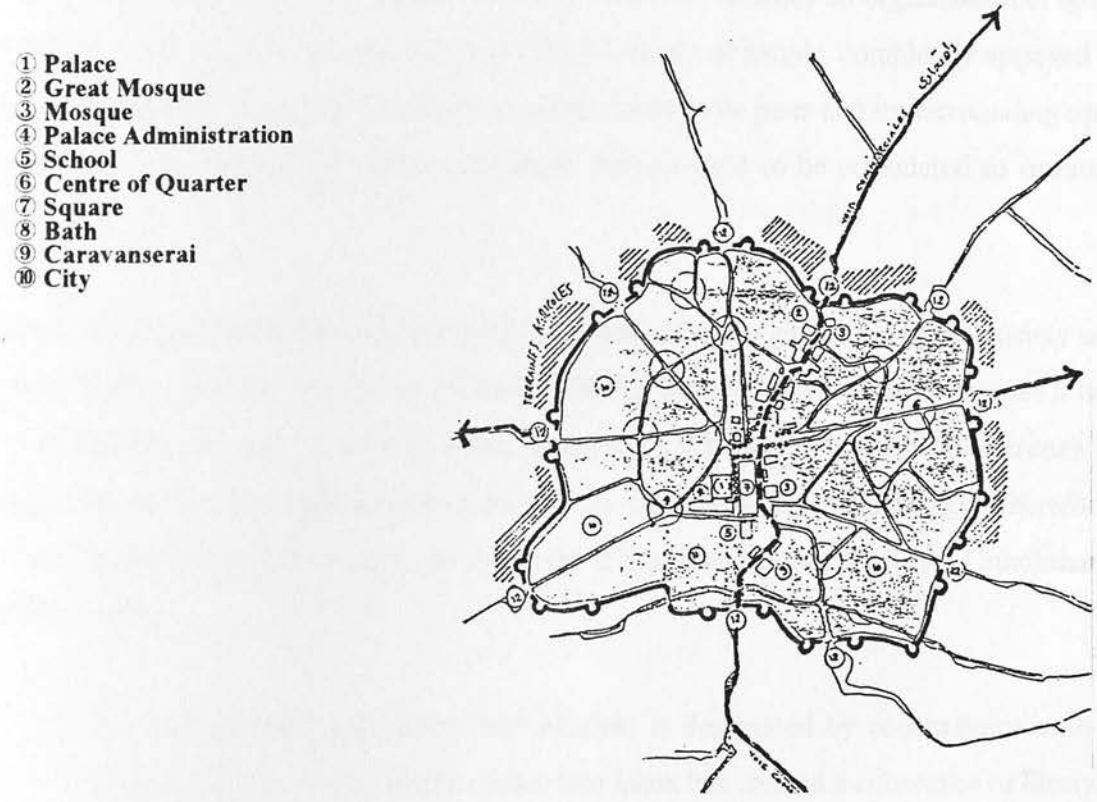


Figure (5.7) Spatial Structure of the City in 'Safavid' Times. 'Natural' Islamic City, Iran, at the Time of Safavid, AD 1100-1300 (Source: Habibi, 1991)

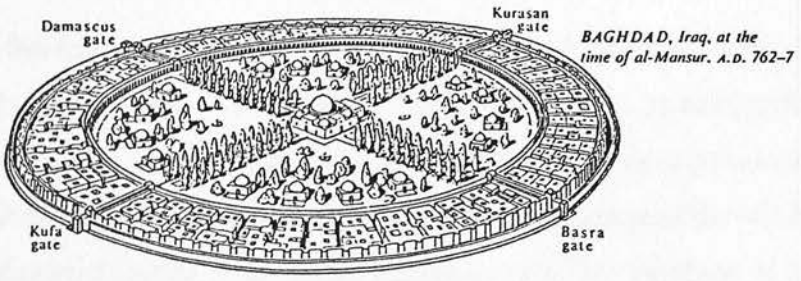


Figure (5.8) 'Planned' Islamic City, Baghdad, Iraq, at the Time of al-Mansur, AD 762-7 (Source: Leacroft, 1976)

5.1.2.1. The Ideal Meaning of the City in the Islamic Period

The primary and also the most important difference between the Islamic city and the pre-Islamic one is the relation between the city and its surroundings. As mentioned before, the city in the 'Parthian' and especially in the 'Sassanian' times was basically an organization of space based on the **position** of the most highly privileged classes of people, completely **opposed to its surroundings**. There was actually no relations between its parts and its surrounding rural areas. In this organization, therefore, farmers had no right to be considered as ordinary citizens.

But, in contrast, the Islamic city had another meaning of the organization of the society and space. Unlike previous cities it had no **contradiction with its surroundings** because it had no exploitation manner. And, also, it had no **especial privilege or especial preference in regard to its surroundings** because it had no city-state autonomies. As a result, therefore, it was foreign to spatial separations within the city and its surroundings. As Cruickshank (1996) writes:

> "No architectural style, other than Muslim; is designated by concordance with a religion. This is for the special reason that Islam has created a coherence of lifestyle over wide geographical areas. This focuses on the requirement of the religion, the behaviour that derives from it and a living language... which is understood throughout

the Muslim world. The consequence is a centrality created by, among other things, the annual pilgrimage to Mecca in the Hejaz in western Saudi Arabia" (p. 561).

Islamic rules were in fact faraway from exceptional privileges and all different levels of social distinctions. Therefore, there was no differentiation between city and its surroundings or between different parts of its spatial organization. According to Islamic expression of the worship of the one God, Muslims were those who submit to the expression of the will of God by the Prophet Mohammed (pbuh[1]). The spatial consequence of this keystone of Muslim philosophy was the natural acceptance of the space appropriate to the circumstances of Islam. In this relation it is noted by Cruickshank (1996): "Although from a twentieth-century viewpoint the emergence of Islam seems revolutionary it was in fact an evolution in teleological, philosophical and architectural terms" (p. 564). However, the study proposes that it is neither a revolution nor an evolution, but a gift from God which depends on how human beings could idealize it.

Thus the Islamic city is first of all a citadel of faith which its Islamic ideals are preferred to its military or economic targets. In fact, there has been a close relationship between the Islamic ideology and its city from the first moment: "Its foundation is, in essence, an attempt to purify the established pattern of worship, rejecting paganism and providing a fundamental base for monotheism free from idolatry" (Ibid., p. 568).

Therefore, it is in the city that the Islamic ideology forms its first government, and Yathrib is the first city which is founded with Islamic ideology. In early years (622) when the Prophet Mohammed (pbuh) took his followers in Yathrib, a town to the north of Mecca, it thereafter became the City of the Prophet (pbuh) or, simply 'al-Medina' - 'The City'. Actually the flight from Mecca marks the beginning of the Muslim era (Ibid., p. 566). A city that apart from its administrative position has a great role in religious position. It is, in essense, a place where religious tasks and social ideals are fulfilled. Thus, the Muslim Prayer and the Friday Prayer both become the duties and the ideals of the people. It is in the Great Mosque (i.e. Masjid-i-

[1] 'pbuh': peace be upon him

Jami) that they both take place.

Therefore, in addition to its religious character, the city also has *social* and *political* capacities and Muslims by participating or not participating in Friday Prayer announce their satisfaction or dissatisfaction with the state. The Great Mosque (Masjid-i-Jami) by resting beside the main junction or the link between main junctions of the city - the market place - is not only the heart of the thought, belief and the ideal of the people and the place but is also involved in the economic activities and the market decisions.

"'Islam' means literally submission, and 'Muslim' is the word for one who professes the Faith which took its authority from revelations vouchsafed to the Prophet Mohammed (pbuh) in the years 610-622, during which times its articles were codified and its essential characteristics established (Ibid., p. 568)." The precepts, therefore, governing the lives of Muslim imply requirements for space peculiar to believers. The annual pilgrimage brings the faithful from all parts of the Muslim world to Mecca. This imparts a degree of unity which justifies a separate category for spread widely across Asia and Africa in many different climates and kingdoms. Also, Nasr (1973) explains that the holy city of Mecca polarizes all space for the supreme Islamic rite of the daily prayers, toward which worshippers turn five times a day, a ritual for whose celebration mosques are mainly built. This centre polarizes all space and even affects in a practical manner the construction of cities. But besides this centre, smaller holy places poles that qualify space in their own environments (p. xii).

Actually, Muslim thought is codified in three works. Of these, the Quran is regarded as a revelation through the medium of the Prophet Mohammed (pbuh); the Hadith is a collection of his sayings or injunctions, and is of lesser weight; and while the Law is extracted from the Prophet's instruction, from *tradition* and *example*. On these basic compilations rests the whole philosophical structure of the Islamic world. This shows how important is the *exemplar*, 'The City', that the Prophet Mohammed (pbuh) founded in 'al-Medina'.

5.1.2.1.1. The Role of the Mosque in the Foundation of the Islamic City

The synthesis of the styles of many conquered peoples under the impact of one philosophy and

one religion in the many different circumstances of the centuries of Islam was a cultural achievement of which only one facet is an organization of space fundamentally centred upon worship. At its heart is the mosque, an inward-looking building whose prime purpose is contemplation and prayer. Its prayer space is removed from the immediate impact of worldly affairs, although it is not designed to be emotionally uplifting nor to produce a sense of exultation. There is no positive object of adoration. It is entirely a place of congregation for the faithful and for appropriate communal activities. Although it is not set apart, after the first four centuries of Islam it does become an exemplar, embodying architectural styles and fashions which, even though they may have evolved elsewhere, are codified and stabilised in the mosque and its associated monumental buildings.

Above all things, the mosque is democratic. In the mosque all have equal rights, and the building may serve many functions other than prayer. It is still commonly used as a school, business transactions may be made there and treasures may be stored. Proclamations are made there and consultations held. Under the complex pressures of modern society, however, some of the historically important functions of the mosque have been transferred elsewhere. Although the mosque may retain its libraries these too have been superseded, and travellers reaching a town no longer go first to the mosque and its ancillary buildings, where shelter and hospitality once were provided to the newly arrived traveller and to the poor.

Although it is now less possible for the community to bathe, eat, sleep, debate and be schooled there, the mosque complex remains the focus of Muslim life. It is always planned on an axis directed towards Mecca. This axis is always terminated on the inner face of the mosque by the mihrab, usually a niche, where the leader of the congregation makes his prayer. The congregation assembles in lines traversing the main axis and takes its cue from the leader or those in the centre of the line in a position to observe him.

As Habibi (1991) explains, there are four periods which are distinct in the position and role of the Great Mosque in the Islamic city:

1) First, the beginning of the Islamic period when mosques appeared in a very ingenuous

form. The exemplar was the mosque of al-Medina - the mosque of the Prophet Mohammed (pbuh). There was no difference between Islamic ideals and political decisions at that time. In conquered cities the Great Mosque either was placed on the site of the old temple or was built next to the main square of the city. However, in the Agoras of 'Hellenic' cities, in the Forums of 'Roman' cities and in the Squares of 'Sassanian' cities every where it was located in the heart of the city.

2) Second, shortly after the beginning of the Islamic period when the Great Mosque was clearly appeared in close relationship to the government (Umayyad Caliphate). This time, it was built beside the palace and was completely in the hands of the governor who was looking for the political powers through the Islamic ideals.

3) Third, at the end of the first century of the Islamic period when the political and religious powers were separated from each other. This time, the Great Mosque was also separated from the government. It was built distant from the palace (Abbasid Caliphate). The Iranian culture of the Islamic ideals started to develop in this period.

4) Fourth, from the sixth century of the Islamic period onward when the appearance and the distribution of the Great Mosque changed fundamentally. This time, instead of being a place for prayer and political decisions it was a place for government to show off its power. The impressive grand appearance and the monumental style of its architecture started to play an important part in its structure when the method of glazed tile both as cover and as decoration also entered in the Iranian architecture of the mosque and its related monuments. From this time onward, it became the place of scholars who were looking for spiritual and religious knowledge. They mostly studied Islamic education and Divine wisdom where Islamic schools (Madrassa) were also established. They worked on the discourses of Islamic ideals and sometimes they acted against governments.

5.1.2.2. The Symbolic Meaning of the Iranian Islamic City

If the idea of truth is something hidden that has to be wrinkled out - then, we are engaged in

an open-ended act of discovery which is deeply committed to 'examining things', and 'allowing people to discover their own forms', deeply committed to the celebration of life. Thus, if the spatial artifacts of man are the crystallization of **symbolic forms** united through prescribed systems of relationships reflecting **functional activities**, it emphasizes not only the mode of expression but also what is is to be expressed. Therefore, in this respect, space "... is not the materialization of abstract Euclidean space which then provides a frame into which forms are 'placed', it is qualified by the forms that exist in it" (Nasr, 1973, p. xii).

Islamic art is no more than an attempt to reflect the world of the form of the Quranic revelation, the Oneness of God and Unity. Its forms relate through multiple states of being in a hierarchical structure to Unity. This symbolic function encompasses spaces while leading to a central point (Ardalan et al., 1973). Nasr (1973) explains that "a sacred centre polarizes the space about it just as the holy city of Mecca ... polarizes all space for the supreme Islamic rite of the daily prayers. The very existence of Mecca, toward which worshippers turn five times a day - a ritual for whose celebration mosques are mainly built - already polarizes all space and even affects in a practical manner the construction of cities (P. xii)." Therefore, the concept of qualified space regulates architecture and provides the means for the architecture to achieve unity and synthesis, to create a building or a city which helps man integrate his daily movements into the Centre (Ibid., p. xiii).

5.1.2.2.1. Symbolic Forms

Therefore, the space that is realized in the Iranian Islamic city seeks either to actualize this Centre in a direct manner or to indicate it in an indirect way (Ibid.). Hence, such as the processes of nature, it forms certain systems of order that are **symmetrical** or **rhythmical**, or both. It emulates these orders by either creating ***geometric forms*** **which are symmetrical with respect to their centre** to symbolize 'unity within unity' - the first principal of Islam (*tawhid*[2]) (see Figure 5.9); or by creating **a system of inexhaustible multiplicity of creation** to symbolize the effusion of Being that emanates from the One: 'multiplicity within unity' (see Figure 5.10). The complementary system is in fact nature in its profusion of rhythms

[2] tawhid: Unity, the Oneness of God.

expressed in infinite patterns - simultaneous, staggered, or harmonious cycles with no beginning and no end (Ardalan et al., 1973, p. 6).

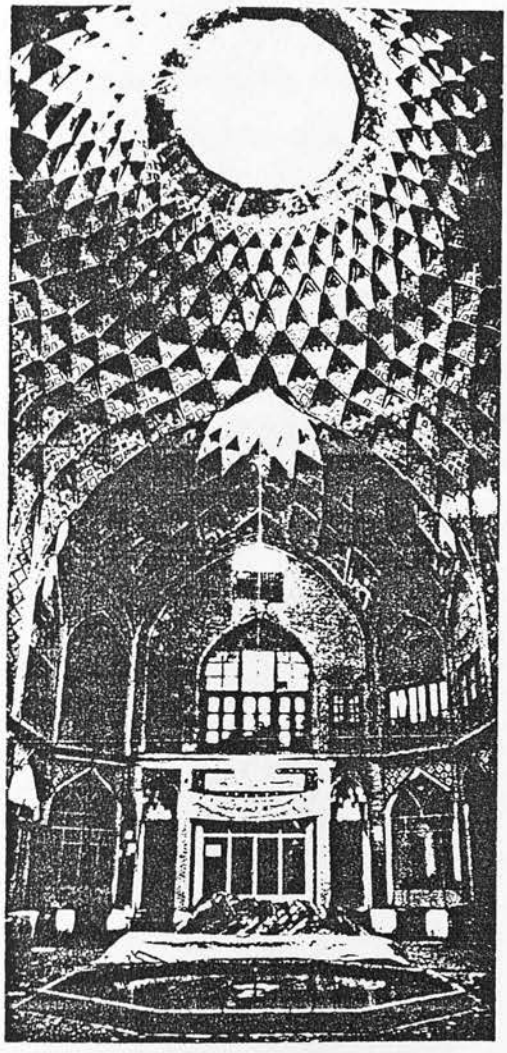


Figure (5.9) Timchah-yi-Amin al-Dawlah, the Bazaar of Kashan, Iran, 19th Century (Source: Ardalan et al., 1973)

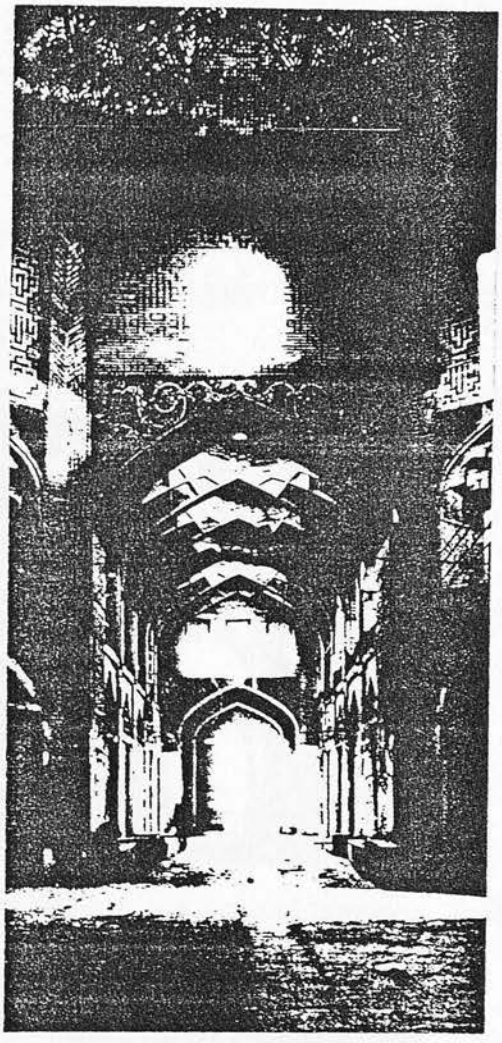


Figure (5.10) Qaysariyyah Bazaar in Isfahan, Iran, 19th Century (Source: Ardalan et al., 1973)

The integration of the externalization of this idea in the Iranian Islamic urban environment, presents the simultaneous movement system of the bazaar, which creates a continuous flow of hierarchical harmonious spatial experiences. This creates either the point of the mosque or the line of the bazaar, to which the soul of man turns. "This reorientation towards a moving point introduces a vital planning concept which accepts growth and change as natural phenomena of existence" (Ardalan et al., 1973, p. 89). The paradoxes of constancy and

change, of completeness within incompleteness, provide within them the heritage of their past and the seeds of their potential future (Ibid.).

But, how are diverse elements physically related and the unity within multiplicity achieved? The primary continuity results from the concept of positive space exalted through the profound use of symmetry and rhythm. "The synthesis is achieved through continuous space, defined by cyclically repeated geometric forms, cumulatively sensed through movement. Movement coalesces space and time into a unity that is infinitely extendible in space, yet finitely complete at any given point in time" (Ibid., p. 95). (see Figures 5.11 a, b, c and d)

Figure (5.11a) Bazaar, Kashan

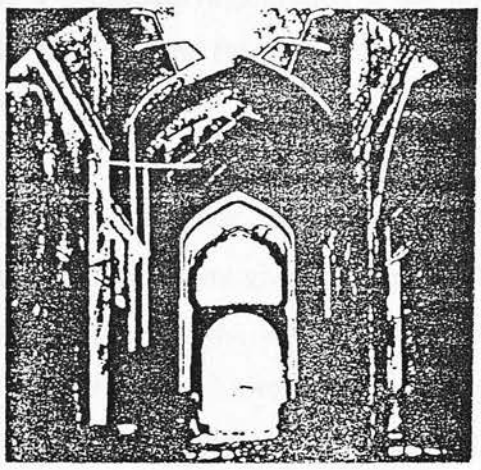


Figure (5.11b) Transition Space, Caravanserai, Kashan

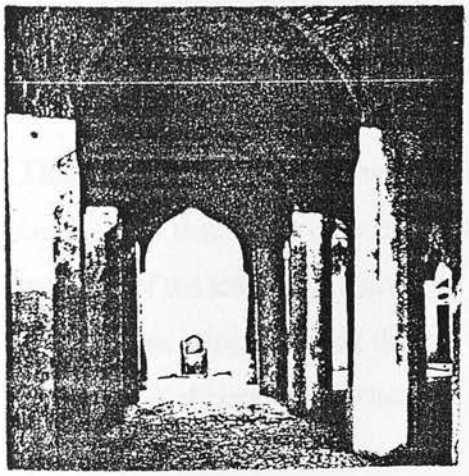


Figure (5.11c) 'Mihrab', Masjid-i-Jami, Isfahan (Source: Ardalan et al., 1973)

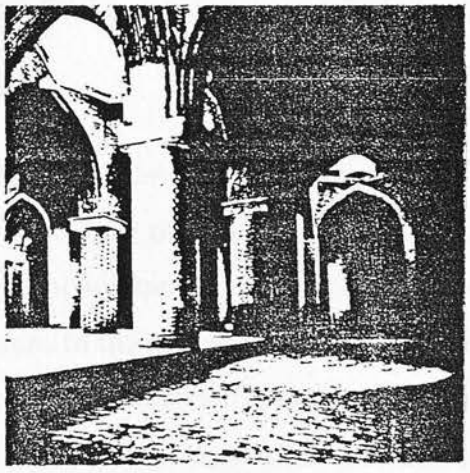


Figure (5.11d) Transition Space, Masjid-i-Jami, Isfahan

By symmetrically repeating the forms in serial or circular order, a moving architecture is created. "Not only is each unit ... designed according to geometrical laws, but their very placement together in symmetrical repetition continues the spatial flow. For the role of time in traditional architecture, one looks to the rhythm of the continuous system. Time, in this system, is the drawing of boundary lines that separate, and yet allow unbroken rhythmic flow (Ardalan et al., 1973, p. 96)."

5.1.2.2.2. Functional Activities

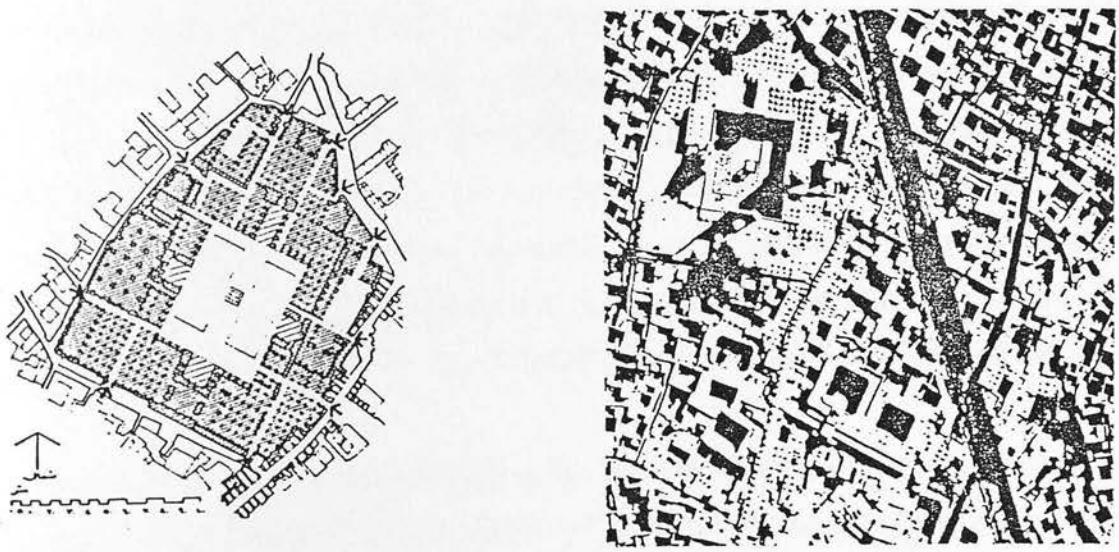
As Abu-Lughod (1987) quotes from Marcais (1928): "Islamic civilization is not merely a set of religious beliefs, but also a functioning society which organizes the life of Muslims into a community not just of believers but of doers." The physical organization of the bazaar was also ordered in a certain hierarchy which was not accidental (Marcais, 1928). To quote at length from Abu-Lughod's (1987) translation:

> "... the centre [in Islamic city] is occupied by the Great Mosque, the old political, religious and intellectual centre, where the courses are given to students from the various schools. Near the mosque, the religious centre, we find the furnishers of sacred items, the candlesellers and perfum sellers... also near the mosque, the intellectual centre, we find the bookstores and bookbinders... and finally not too far from Great Mosque we find the economic centre, a secure place encircled by walls where foreign merchants come to display their materials.... After this again the jewellery sellers, the hat makers, and furniture makers... and farther out are the blacksmiths... and so on" (p. 156-7).

This also shows a hierarchy of functions leading to the centre, a process in time which emphasizes that in the case of an Islamic city, not only the structure of the city either the structure of the ideals or the structure of their symbolic expressions emerges from the centre, but also this structure itself directs all attentions to the centre. Its symbolic message is an organization of hierarchical relationships, either forms or functions, leading to the centre, the value itself is unity. Therefore, if the symbolic message in many thoughts are examples such as: 'Love', 'Cosmos', 'Sun', etc., in Islam, the message is 'Unity' manifested in 'unity within

unity' and 'multiplicity within unity'. Here the mechanism of the centre i.e. the role - the structure - and the message of the centre i.e the value - the unity - are the same.

In Muslim cities, therefore, the Great Mosque is the centre of space; it is neither the centre of high position nor the centre of strategic location. It is the centre of *accessibility* (Figure 5.12a); the link between *local* and *global* (Figure 5.12b); the link between *elements* to achieve the *function* (Figure 5.13); and the link between *functions* to achieve the *essence* - the unity (the ideal principle of Islam).



Figures (5.12) Left (**a**): Isfahan, Spatial Relation between the Courtyard of the Masjid-i-Jami and Surroundings Pathways (Source: Tavassoli et al., 1992).
Right (**b**): Isfahan, Aerial View of Masjid-i-Jami and its Relation to Domed Roofline of the Bazaar (Source: Ardalan et al., 1973)

Figure (5.13) Isfahan, Domed Roofline of the Bazaar Heading towards the Gateway

Unlike a central position in which a value (i.e. a symbol) is placed, the value of a positional centre, in contrast, a central position is valued and related to everywhere in space, the value of a relational centre. Location has only the value of position, but relation has also the value of meaning. In fact, centre in the pre-Islamic period had only the value of position: high, safe, and strategic without accessibility and relation to the other places. But, centre in the Islamic peiod has also the value of meaning: accessibility and admissibility.

Orientation of space, its qualitative polarization, and the relation existing between space and form, which is the reverse of the relationship that is commonly believed in today, are essential elements of the traditional Iranian Islamic design and a key to the understanding of its symbolic expression of the unity (the symbolic principle of the Iranian Islamic city). Ardalan et al. (1973) explain: "Once the **qualitative** aspects of space are made apparent, their **quantitative** uses follow directly. Thus the positive and vital concept of space generates all architectural creations. This concept - **that space, not shape, should lead in the generation of form** - is central to an understanding of the architectural tradition of Islamic Iran" (p. 15). [the importance of shape as the container (*jism*[3]) vis-a-vis space as the contained (*ruh*[4])][5]

The circumstances of the encounter of **'space'** with the **'boundary shapes'** determine the particular design expression. Creative excellence depends upon the strength of the encounter and the clarity of its expression. This relationship of space to shape is perceived in distinct levels of interactions: "The city is viewed as an active shape bounded by passive space. Moving within the three-dimensional mass of the city, active, positive spaces interact with negative, passive shapes. Through the use of geometry and mathematics, a vital positive space carves a hierarchy of negative, geometric volumes through which the soul of the city flows like a river that has furrowed channels in the crust of the earth.... A hierarchy of spatial linkages provides an orderly system that allows for both constancy and change" (Ibid., p. 17).

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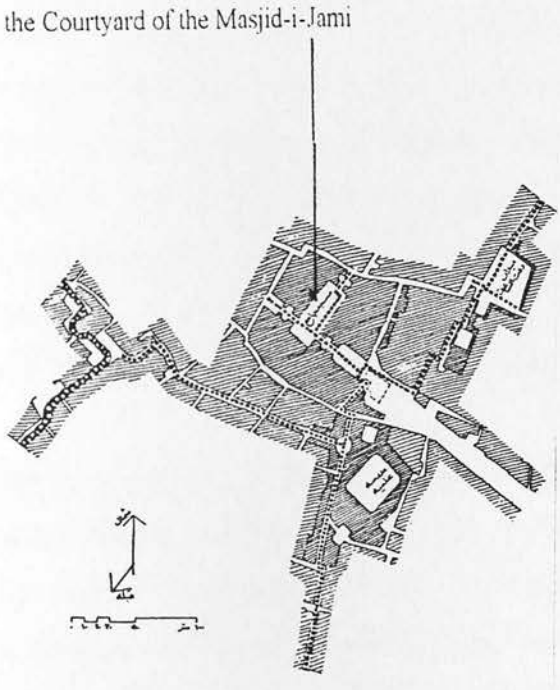
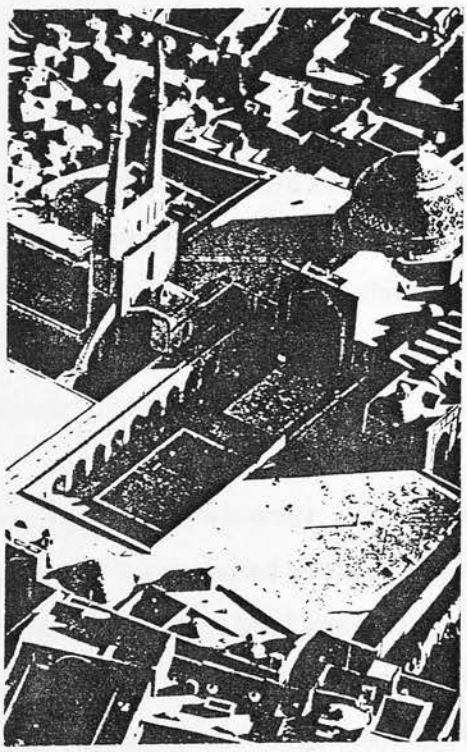
[3] jism: Body

[4] ruh: Spirit

[5] The concept of 'place' or *makan* is composed of both the container (*jism*) and the contained (*ruh* or spirit). It does not have a tangible existence, but exists in the consciousness of the beholder who visually perceives the spirit as 'contained', defined within the boundaries.

Finally, the elementary fact that man moves through **unobstructed space** rather than through **solid mass** is recognized in Islamic design of the Iranian city which, by its very dependence on a **positive continuous space, creates no discontinuity or any impediment to the flow of man** (Figures 5.14 a and b). Man moves continuously in an undulating and expanding space that is forever united (Ibid.). It is therefore necessary to understand the way traditional man viewed not only the totality of the design but also its components . Cartesian philosophy was *instrumental* in quantifying space to such an extent as to obliterate, particularly, all memory of the qualitative space upon which all religious rites and orientation are based (Nasr, 1973, p. xii). In fact in the symbolic way of design, space is never divorced from form: "it is not the materialization of abstract Euclidean space which then provides a frame into which forms are 'placed'. Space is qualified by the forms that exist in it" (Ibid.). In this view, the creative design is less concerned with objects in space than with the preservation of the space itself.





Figures (5.14) Left (**a**): Yazd, Access to the Courtyard of the Masjid-i-Jami (Source: Tavassoli et al., 1992)
Right (**b**): Yazd, Spatial Relation between the Courtyard of the Masjid-i-Jami and Surroundings Pathways (Source: Kiani, 1986)

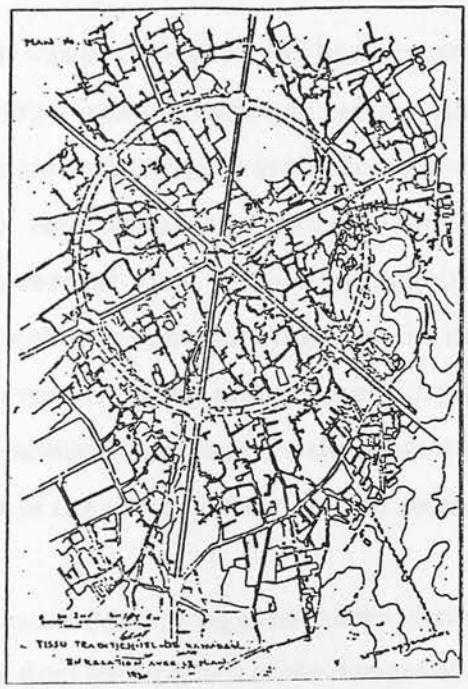
5.1.3. The Contemporary Period

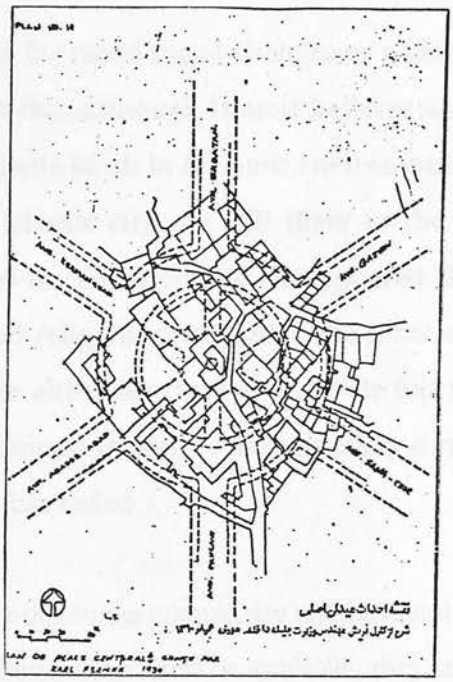
Then how does it work in such a planning in terms of the analytical attempt to break complex urban situations in order to simplify them when in reality they are not really simplifiable. It is in fact "... using the adjective 'Cartesian', based on Descartes' analytical approach which suggests that if something is very complicated you should break it down into small sub-problems, sufficiently simple to be resolved separately" (Wilson, 1996, p. 3). But, separating space from time, the quality from quantity is to avoid the encounter, to deny its existence, and thus to create conflict and incompleteness. This separation defines the distinction between a Fine Art which 'serves only itself' and a Symbolic Art which 'serves an end other than itself', fulfils some operational need and ambition in society.

The problem with a Fine art or in another words with an *instrumental* art appears when its only criteria is style. As Wilson (1996) explains, for example, in Modernism the first rule calles for 'volume' rather than 'mass', the second rule 'regularity' rather than 'symmetry' the third rule avoidance of applied decoration, and finally the fourth rule stopping symbolic expression by allusion to the past. Or even later, in Post Modernism there are also four rules: the first rule calles for mass, the second for symmetry, the third for the return of decoration, and finally the fourth demanding allusions to the past, only the opposite game. But if we take the first definition of design as a Symbolic Art which is required to serve a purpose other than itself, it cannot be discussed in those terms at all. This kind of design refuses to leave anything out that is relevant to the way of life. Hence, if it was awkward or too bad, it would start again, a different kind of 'order in use' is to be found and this would create its own rhythms.

Stylistic orders are, therefore, examples of *instrumental order* not *symbolic order*. And, in the case of Iranian contemporary cities the instrumental order of design started to organize the city when for the first time the city of Hamadan was designed based on Modernist thought. It was fundamentally built on the principle of Modernism, in which any symbolic structure of design was regarded as an obstacle for its instrumental purposes. The new organization for the city of Hamedan was planned by 'Karl Ferichs', the German factory man who was the owner of factories of leather, matchmaking, and carpet weaving in the city of Hamadan. The plan was principally aimed for the rapid circulation of goods and capital.

His proposal plan was consisted of a vast *maydan* (ring road) round the central area (about 150 m in diameters) with 6 wide streets radiating out from it (Figure 5.15a). These streets, by passing through the traditional fabric of the city and destroying the sense of privacy and peace, made their way towards a belt boulevard only about 750 metres away from the central *maydan*. The new plan by occupying the Grass Market located in the central area also destroyed the sense of structural design in the traditional old bazaar (Figure 5.15b). In 1930, his proposal plan was accepted and days later it was carried out (Habibi, 1991).





Figures (5.15) Left (**a**): The Proposal Plan for the City of Hamadan by Karl Ferichs, 1930, Iran (German Engineer Working in the Home Office)
Right (**b**): The Proposal Plan for the Central Area of the City of Hamadan by Karl Ferichs, Iran, 1930 (Source: Habibi, 1991)

Therefore, in the beginning of the twentieth century the structured plan of the Iranian Islamic city found itself going through a very enormous change. It was an instrumental idea of design based on a desired central-radiant plan that changed all *symbolic principles of structural design* in regard to access to *the ideal principle of Islam - the unity*. It was a destroyed and ruined sense of bazaar which was no more than an ordinary route. *It had no sense of meaning and direction to the centre*.

By now, **the city was an accumulation of separate blocks of residences with no relation to each other and to the bazaar, an unstructured urban fabric completely ruined and devastated away from the sense of unity and ability, a destroyed sense of unstructured reference either ideal or symbolic**. But, in contrast, **in this situation there was a perfect ability for the growing process of rapid circulation of goods and capital** - the conquest of capital. It was undesired by people, but from the other hand, it was absolutely the demand of the international market from the end of the nineteenth century onward. It all happened all over the country, in all cities.

In this situation, therefore, **city has become a place for rapid social changes or a place for non-organized and damaged social relations**. In fact, **although Islamic believes are still there among people, the symbolic expression of these ideals in the built environment has gone. And although all the elements of the Islamic city are still there in the built environment, their relation to each other and to the centre has disappeared. Even, although people do participate in all rituals and religious ceremonies, the sense of the achievement of the unity in every day practice either abstract or concrete has gone. And, although people are in the process of participating social relations every day, the sense of the unity in their Muslim community has faded**.

Because all theses changes have been forced from outside the community and have not been arisen from the structure of the thought of the society, either ideal or symbolic, they are not actually the structural transformation of the previous identity, but unstructured changes across the symbolic expression of the ideals which have been led to the unstructured changes in social ideals. In this situation, therefore, the concept of centre reverts back to the previous time, time before the Islamic period.

Hence, **whereas change in the urban fabric might not be the only cause for the change in social relations, it can be argued that it is one of the more important ones**. In fact, **it affects social relations indirectly but very efficiently as it involves everyday practice either individually or collectively, and either ideally purposeful or symbolically self-reflexive**. In essence, it affects the structure of the thought of the society and disables it.

Therefore, although people have their own structure of thought, they become gradually unable to use it in the structure of their own built environment.

In a sense, in this case, **development like any other goods is imported into the process of the life of the city without any attention to the desire of the people**. Thus, **whatever is important is neither the internal meaning or the message of the city - the ideal of unity - nor its living urban identity - the symbol of unity - but the external form of the city**. Therefore, **because they are just *stylistic ideas* which could be exported to every where, they only serve themselves**. And, **as they are not *structured ideals* which serve an end rather than themselves, they do not fulfill some operational need and ambition in society**. Hence, **not only they do not care for the genuine structure of the city but also by ignoring its living identity separate its united elements**. They support only the process of circulation of goods and capital. Centre in this respect, therefore, not only loses its ideal organization of space but also gains a non-organized stylistic design of forms and elements.

5.2. The Centre of the City of Meshed - A Case of Built Form

The city of Meshed which is the centre of the province of Khorassan, is situated in the north eastern part of Iran. Khorassan was first inhabited by the Aryans; a group of them later migrated to the south of Iran, and another group called the Parthians remained in this territory. Khorassan territory, as mentioned before, gained special importance during the rule of the Parthians, and its commerce and urbanism developed.

Khorassan consisted of 4 parts during the Islamic period: 'Nishabour', 'Herat', 'Merv', and 'Balkh'. Nishabour was located in the north of Khorassan territory, and included the main region of habitation in Khorassan. The main reasons for the selection of north Khorassan by the Parthians for settlement were: a) the region's naturally strategic location for defence; b) its location on the path of the silk road and also other trade roads of Afghanistan and Turkey; and c) the existence of water and fertile lands (Eshragh, 1981).

'Noghan' is an area in Nishabour where Meshed came into existence, and 'Sanabad' is a famous village near Noghan in which the eighth Imam of the world's Shiite, Hazrat Imam Ali-Ibn-

Musa-al-Reza (pbuh), the great grandson of Prophet Mohammed (pbuh) is buried there. When Noghan and Sanabad became the habitats of the migrants from Nishabour (centre of the north Khorassan) and also other parts of the region, these two gradually expanded and were united to form the present city of Meshed (Ibid.).

The Persian literal meaning of the word Meshed is the 'place of martyrdom'. This is because Hazrat Imam Ali-Ibn-Musa-al-Reza (pbuh) had been martyred and buried there. Consequently, this city acquired its name as such and became a holy city. The Holy Imam's Shrine (pbuh) is one of the greatest places of pilgrimage for Shiite Muslims throughout the world.

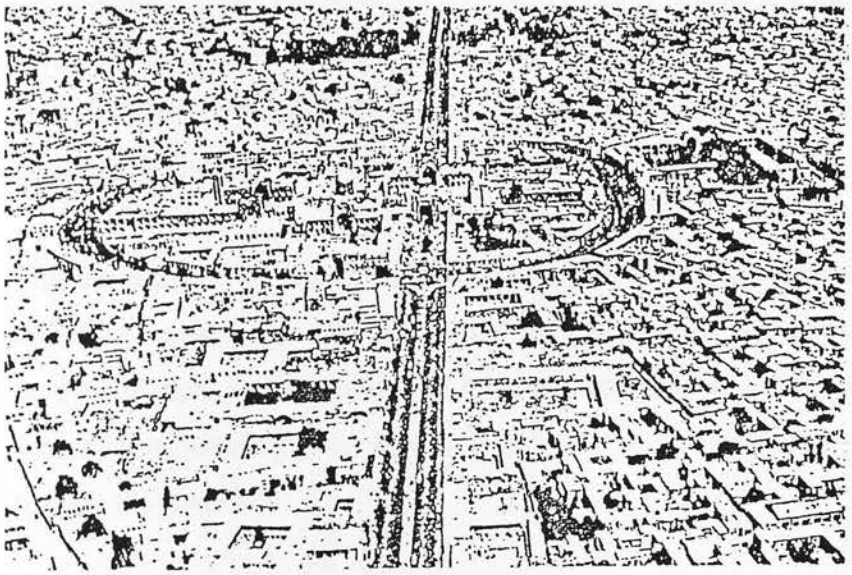
All passages of this city converge at the Holy Shrine of Imam Reza (pbuh) located in the historical core of city of Meshed. Every route of approach from a long distance always enables one to catch the attractive sight of the Harem as the focal point. Local people and people from cities far and near, appear to make pilgrimage to the Harem a number of times, and of course, after performing their pilgrimage disperse; busy in various activities of their own. Almost everything of interest is within walking distance of this unmistakable landmark.

Nowadays, the plans for the future development of this historical core include "hotels, apartment hotels, stores and shopping centres, cultural centres, new park and green spaces, efficient network of streets and sufficient parking spaces... commercial centres, and also centres for holding conferences and seminars of the Islamic world around the Holy Harem" (Khorassan Maskan Sazan Company[6], 1994). "The project of 'Restorations and Reconstructions Around the Holy Shrine of Imam Reza' [pbuh] has good potentials for safe investments.... The potentials of investment in this project are so diverse that can respond to various demands of different investors and can meet their demands. This project has the capacity of absorbing foreign capitals" (Ibid.).

In fact, these plans follow on the plans of the forties when radical urban changes emerged in

[6] Khorassan Maskan Sazan Company: Khorassan Housing Construction Company

most Iranian urban textures including the city of Meshed by building through the construction of broad streets and belts around the urban centres for better circulation of goods and capital (Figures 5.16 a and b).



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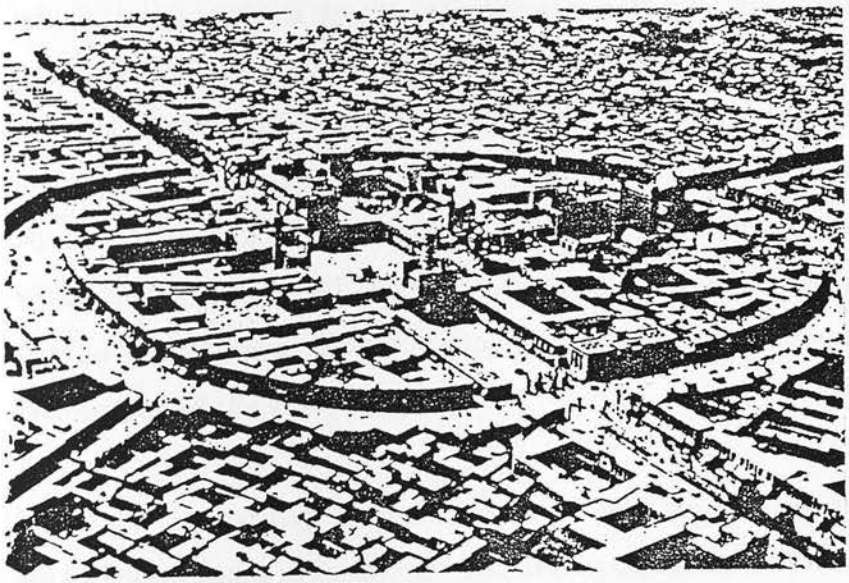

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Figures (5.16) Above (**a**): Meshed, Historical Core, 1930
Below (**b**): Meshed, Historical Core, 1935 (Source: Mohseni, 1992)

The construction of the ring road around the Holy Shrine destroyed the traditional part of the city and made an immence impact on the integrated texture of the city centre. Allowing cars to access the heart of the city resulted in breaking up the texture of the area, separating the Harem physically as well as spiritually from the rest of the city. This not only disturbed the texture of the old city but also put great pressure on the buildings outside the belt as well as the buildings inside. The buildings outside the belt gradually lost their holiness, history, and spiritual connection with the Harem, and also the Harem lost its spatial connection with other parts of the city, especially the bazaar and its attachments. The belt became the physical and positional limitation of the historical centre.

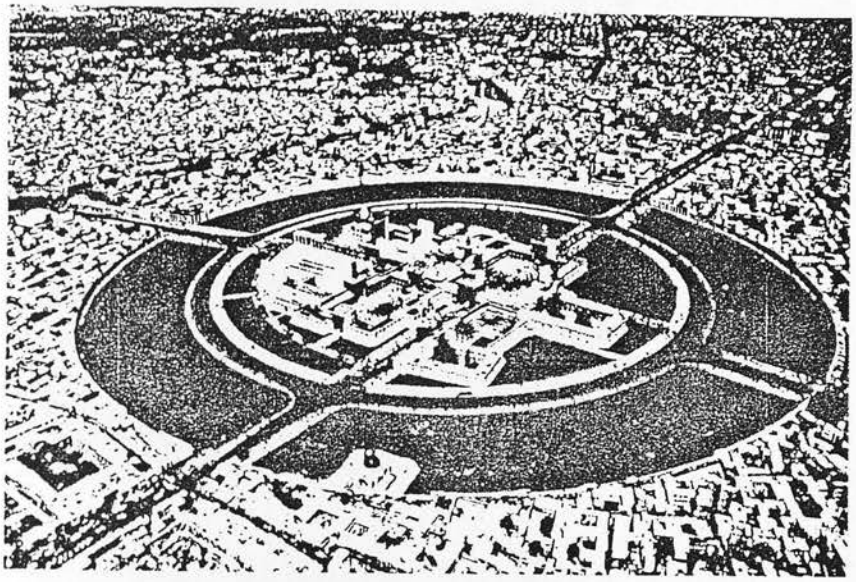
The introduction of automobiles to the city of Meshed, especially its historical centre, therefore, resulted in a belt road round the Holy Shrine which had only one instrumental purpose in mind - accessibility. But there is a fundamental question here - does, for people, access mean spending less time or it is an unfolding participation in place which takes them to their destination?

Further construction happened in 1985 when after demolishing buildings inside and outside the belt a vast green area appeared around the Holy Shrine (Figure 5.17). The proposal plan was in fact unsuitable for the local climate, as keeping the area green was a huge and sometimes impossible task to do. Next, a circle wall appeared around the green zone which completely separated the urban texture from the Holy Shrine. It positioned the Holy Harem[7] in the centre of the circle. But, another question also arises - does for people centre mean a position and location or it is an organization of structure of thought, either ideal or symbolic, which relates them to their desires in everyday life? **It seems the concept of centre again goes back to its earlier times, a replication of the meaning of the centre as it was in pre-Islamic period** (Figure 5.18).

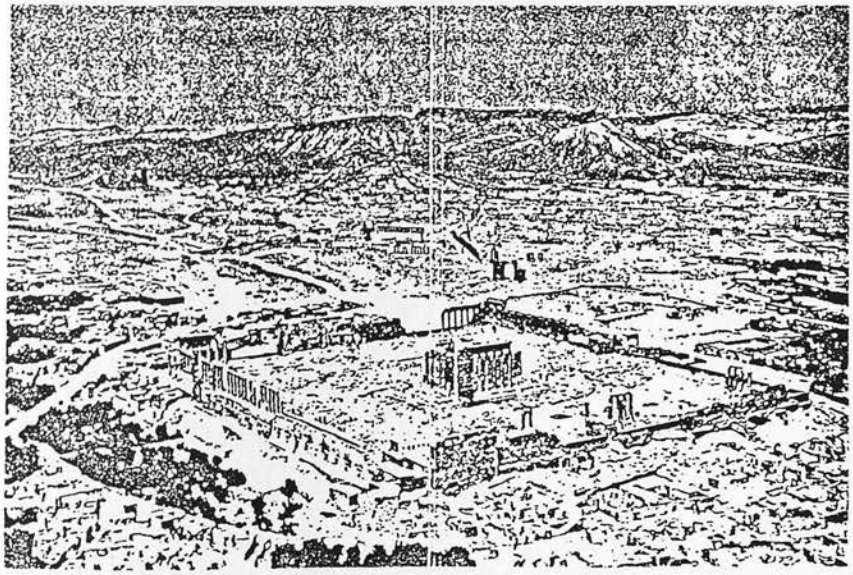
In fact, the construction of the vast open space around the Holy Shrine resulted in demolishing the traditional texture of the city and also destroying the most historical buildings around the

[7]the Holy Harem: the Holy Shrine of the Hazrat Imam Ali-Ibn-Musa-al-Reza (pbuh)

Holy Harem. The outcome was a superficial stylistic position of the Holy Shrine in the centre of the city with a huge amount of emptiness (Figures 5.19 a and b).



1985



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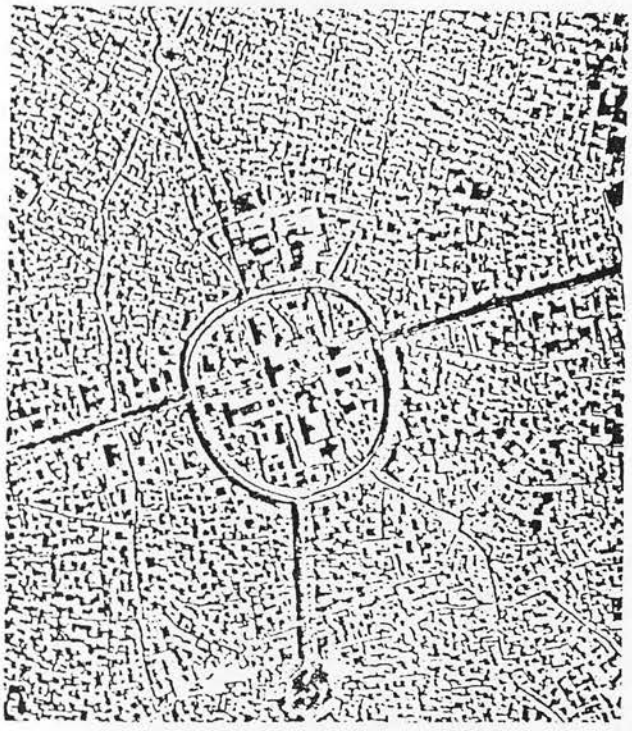
Above: Figure (5.17) Meshed, City Centre, Islamic Period, 1985 (Source: Topography Organization of Iran)
Below: Figure (5.18) Palmira, City Centre, Pre-Islamic Period: Parthian Times, AD 267 (Source: Ghrishman, 1962)



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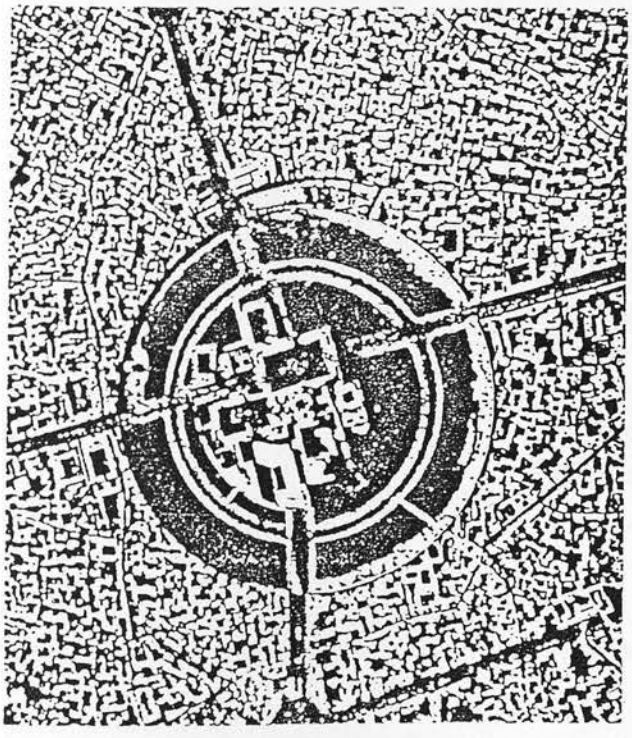

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Figures (5.19 a & b) The Centre of the City of Meshed, 1935 and 1985 (Source: Topography Organization of Iran), The Gradual Change of the Concept of Centre from Symbolic Relations to Stylistic Position, The Emptiness around the Holy Shrine: Lack of Spatial Relations between Urban Elements

And, nowadays the area is going to be changed by further and further separating the Holy Harem from the rest of the city. This will be achieved by destructing more and more traditional textures as well as constructing hotels, shopping centres and also parking areas around the Holy Harem. The proposed plan by Khorassan Maskan Sazan Company has been laid out in Figure (5.20). Today, in addition to open spaces and parking areas there is also an underground pathway to circulate the vehicles around the circle. This plan has not been carried out yet but it is half way through process.

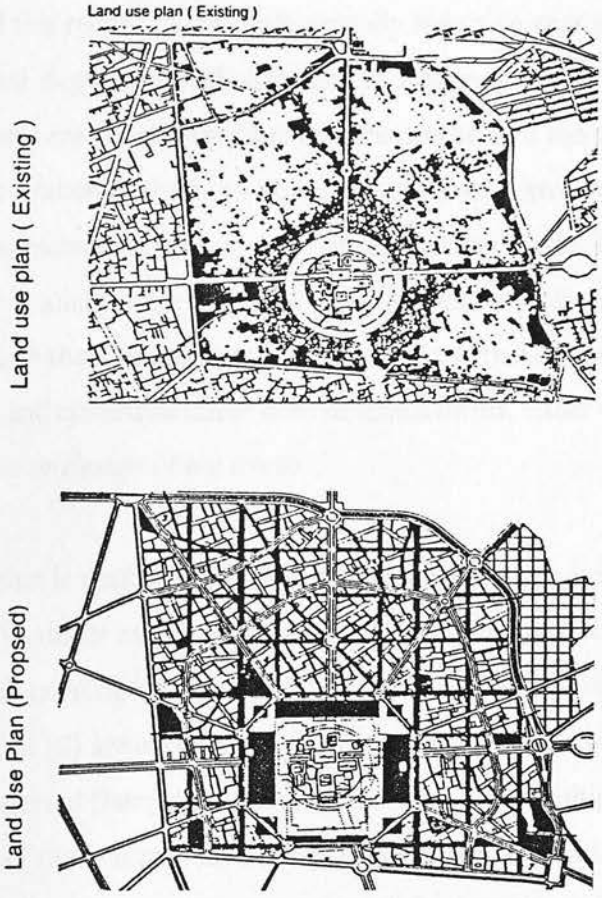


Figure (5.20) Proposed Land Use Plan for the Central Area of the city of Meshed by Khorassan Maskan Sazan Company, 1994 (Source: Tash Consultant Comany/Khorassan Maskan Sazan Company, 1994)

Conclusion of the Chapter 5

There are many ideas that try to explain design and creativity. It is the task of this thesis to talk about the collective aspects of the design process rather than its creative aspects. These

collective aspects refer to a common social content, to the symbolic and ideal agreement existing among social groups and between individuals - the structure. It means, "we are talking about a process which cuts deeper than style, to the underlying order and principles of design: values which transcend time and place" (Serageldin, 1989, p. 233). Two basic elements express in these collective aspects. The first element is the synchronic relation between space and society, and the second is the continuity between past and present through historical understanding of the structure, connecting the past and present spatial forms.

It is in fact about structural continuity that operates at two levels: the parts and *the relations between parts*, the whole. And this relates to the fundamentally recursive character of social life, and expresses the mutual dependence of structure and agency; that the structural properties of socio-spatial systems are both the medium and the outcome of the practices that constitute those systems. These relational aspects so express themselves in two ways: first the effects of conjuncture, the accumulated and socially combined historical product, and second the symbolic charge proper to spatial forms, not in accordance with their place in the urban structure, but with their place in the cultural history of forms. So urban design is crucially concerned with these relational and contextual dimensions of spatial forms, either in the design of parts, or *in the coordination or design of the whole*.

The structural order of space that is realized in the Iranian/Islamic urban environment seeks either to actualize the centre in a direct manner or to indicate it in an indirect way: (1) some emulating natural orders and creating geometric forms with respect to their centre - symbolizing 'unity within unity'; or (2) some creating a system of inexhaustible multiplicity of creation - symbolizing the effusion of Being that emanates from the One: 'multiplicity within unity'. The spatial integration of the externalization of this idea in the Iranian/Islamic urban environment presents the simultaneous movement system of the bazaar, which creates a continuous flow of harmonious spatial experiences leading to the centre. Hence, the synthesis is achieved through continuous space, defined by cyclically repeated geometric forms. Its symbolic message is an organization of hierarchical relations either forms or functions leading to the centre of which the value itself is 'unity'. But, in the case of the city of Meshed there is nowadays a ring road round the centre which is called order. But, it is an order in terms of

instrumental order rather than a symbolic order. It involves only locations and positions rather than relations, only a mass of elements without real relationships, an order of centrality instead of the mechanism of centralising the subject's thought (Barghjelveh, 1997b).

Therefore, in the case of the city of Meshed, the main purpose of the belt, the fast access to the centre focusing on its centrality, is a confusion between two principles of spatial patterning: *instrumental* and *symbolic*, or between the *order of centrality* and *the emergence of order from the centre* (Barghjelveh, 1996). It means that the retention of the shape of the centre does not amount to the retention of symbolic relations, and preservation of the shape itself, is not enough to preserve identity. What has to be preserved is not only a system of appearance, but most importantly a system of constitution of order, the symbolic fabric of an Islamic city which persists in a very core structure, the link between local and global and the link between functions to achieve the essence. Disproportion between symbolic ideals and symbolic expressions causes lack of identity, perfection and completness.

In fact, the instrumental order of the centrality in the centre of the city of Meshed neither solves any existing problems nor has any direction for future development. Since the centre is missing its essence, meaning and transformational role there is neither a way of filtering new information nor a way of programming them. Whatever therefore exists is not the genuine structure of the city, but a mass of elements without meaning and direction.

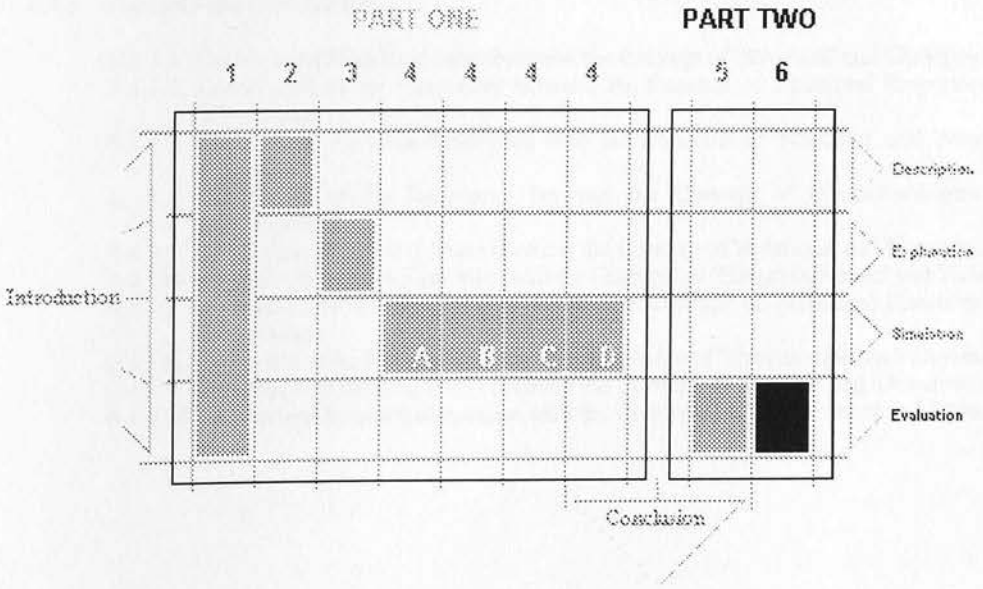
Centre has to have vital identity with participation of all its members. The advantage of expanding and contracting individuals' experiences is to see the parts both in a whole individually and as a whole with each other. Moving inward the centre is the abstract crystallization of the whole experience of the individuals' coherent function, and moving outward the centre develops the identity of the individuals' participation in the whole experience. The first involves the diachronous or space-time dimension of coherent function to achieve the instruction, and the second involves the synchronous or time-dependent dimension of coherent function to achieve the experience. The first is collective and the second individual. It serves as a witness to past achievements and also as a promise for new ones to come.

Since city improves both symbolic and instrumental principles of spatial patterning parallel to each other and this emerges from the centre itself, neither of these principles can evaluate and improve themselves in the lack of the next. In fact, the instrumental principles of spatial patterning, the function of every day production and reorganization, are checked and developed through the symbolic principles of spatial patterning, the function of social reproduction and programming. Although centre has a potential to transfer the structure over time, but transformation takes place when centralization takes place, and this involves both elements and assumptions. Only assumptions show how the elements are related to each other and so to the function. In our case, the stylistic design of the centrality keeps all the elements of the genuine structure of the city and ignores all the assumptions of its ideal programming. But, as we noticed before, from elements alone one cannot make deductions about 'form', one must add to elements a 'principle of organization', a 'form' or an 'idea', immanent in the process whereby order of a characteristic type emerges from disorder or lower order. This transformation takes place when crystallisation and abstraction takes place, and this involves both elements and assumptions. If we cut one of them, the autonomous process will die.

The reconstruction plan of the historical core of the city of Meshed is based on an international concept: the building of a traffic threshold round the area and demanding all the private ownerships. It thus gradually results in separating the area from the rest of the city. Although the proposal plan is something quite alien to the structural characteristic of the unique environment of the city of Meshed but, in the same time, it has a common solution for its central area like any other city in the world. But in our respect, centre needs local people to attendance, their participation and their daily programme for its structural programming and structural transformation. This only happens when the structure of the environment is the reflection of the structure of the mind of the society, otherwise the cooperation will fade and the result would have no sense, no direction and no progress at all.

CHAPTER SIX

MESHED'S CITIZENS ATTITUDES TO THE CITY CENTRE



6

MESHED'S CITIZENS ATTITUDES TO THE CITY CENTRE

Introduction to Chapter 6

When the architects' and planners' understanding of solving the need for access to the centre of an Islamic city - by simply carving fast roads through the intricate web of streets to the central Mosque - confronts a destroyed sense of space and time (inherent in Islamic orientation to Iranian city of Meshed), it is very important to consider people who are the main source of transformation and action. **Does access mean for people spending less time or it is an unfolding participation in place which takes them to their destination** (Rough definition of the problem - see 'steps in analytic induction' in page 289)?

An ordered spatial milieu is a constructed spatial culture which produces and reproduces not only *actual* social relations but also *the principles for ordering social relations*. Hence, the best key to the *spatial structure* of a city might be the generative rules underlying the material form, rather than simply the form itself. Thus, the identification of spatial structure cannot be regarded as the only aim of environmental investigation. But, the instantiation of structure in the reproduction of socio-spatial systems, as its medium and outcome, is the proper focus of environmental analysis.

Since structure is both enabling and constraining, it is one of the specific tasks of socio-spatial analysis to study the conditions in the organization of socio-spatial systems that govern the interaction between the two. **The social survey on Meshed examines the role of city centre in conditions governing the continuity or transformation of the structure**, and, therefore, **the reproduction of socio-spatial systems** (Examination of case(s) to determine fit with hypothesis - see 'steps in analytic induction' in page 289). **The main obtainable issue confirms that people face problem in structuring their socio-spatial systems** (Hypothetical explanation of the problem - see 'steps in analytic induction' in page 289).

6.1. Method of Analysis

To get information about citizens' feelings and attitudes, the author has carried out a social survey, an open-ended questionnaire, to ask each individual in person. The questionnaire is semi-structured - using the method of qualitative research - which asks people about the reasons of their responses in order to have their opinion in-depth. The questionnaire asks

people about likes and dislikes concerning their city, city centre and also other urban places. The main process involved in analysing people's attitudes towards the topic raised in the questionnaire is to categorise and give order to the information gathered. This allows the author to extract an valuable amount of information from an ocean of responses. The survey represents a further continuation of the theory referred here: it is a methodological way to refer to the position of the *theory of structuration*.

The discussion about the nature and relative virtues of qualitative and quantitative researches reveal a mixture of philosophical issues and considerations of the virtues and vices of the methods of data collection with which each of these two research traditions or mixture of them is associated.

6.1.1. The Discourse of Quantitative and Qualitative Research

'Quantitative research' is typically taken to be exemplified by the social survey and by **experimental investigations**. 'Qualitative research' tends to be associated with **participant observation** and **unstructured, in-depth interviewing**. In fact, **philosophical issues** figure very strongly and have much to do with a growing interest in the methods associated with a qualitative style of inquiry. As Blalock (1970) states: "In general, **techniques of participant observation are extremely useful in providing initial insights and hunches that can lead to more careful formulations of the problem and explicit hypotheses**" (p. 45). Indeed, most writers have proposed alternative terms. For example, Bryman (1988) pinpoints to some of them and notes that Guba and Lincoln (1982) propose a contrast between rationalistic (i.e. quantitative) and naturalistic (i.e. qualitative) paradigms, while Evered and Louis (1981) use a contrast between 'inquiry from the outside' and 'inquiry from the inside'. Magoon (1977) and Smith (1983) refer to 'constructivist' and 'interpretive' approaches respectively in place of 'qualitative'. However, he adds, such alternative terms have not achieved a wide currency and the quantitative/qualitative divide tends to be the main focus.

Bryman (1988) describes that in some treatments the quantitative and qualitative research are viewed as competing views about the ways in which social reality ought to be studied. They are essentially divergent clusters of epistemological assumptions of what should pass as

warrantable knowledge about the social world. For other writers, quantitative and qualitative research are denotations of different ways of conducting social and psychological investigations. They are appropriate to different kinds of research question and even as capable of being integrated. When this second view is taken, they are more or less different approaches to data collection, so that, preferences for one or the other are based on technical issues. In this view, the prime consideration is to adjust the appropriate technique to a particular research question. But, Bryman (1988) by mentioning this point that they are more than merely literary devices notes:

> "The employment of a scientistic rhetoric - experiment, variables, control, etc. - in quantitative research imposes expectations on the reader about the sort of framework that is about to be encountered, what sorts of criteria of valid knowledge the author endorses, and so on. In short, such linguistic devices act as signals which forewarn the reader about the material to come. By contrast, the self-conscious endorsement by many qualitative researchers of styles of presentation and literary devices which entail a rejection of a scientific rhetoric can be seen as a countervailing genre. Through their rejection of a scientific idiom and their recourse to the style of qualitative research they signal their adoption of a different framework and expect their work to be read and judged within the confines of that framework" (p. 5).

The broad orientation in qualitative research, therefore, is to focus on the **subjective understanding of how people live, feel, think and act** and so **to understand the world from their perspectives**. The adoption of a perspective which emphasizes the way in which the people being studied understand and interpret their **social reality** is one of the most central themes of the qualitative approach. Hence where the quantitative research seeks to test the validity of theories and the samples are pre-defined at the outset of the research and the results and analysis are in the form of causal propositions in the form of tables, it seems that in the qualitative research, researchers let their subjects form their focal concerns while retaining an awareness of the literature on it. Their samples are determined by whom they meet and contact with during their field-work and are constantly shifting and their research involves different degrees of association with each person. They usually use a much less

standardized approach, relying on observation, conversations, and some informal interviewing. Their results are in the form of quotations which reflect what their subjects deem to be important about their lives and their analysis is 'descriptive' which is concerned with the people's perceptions of changes in their life-style.

It can be summarized these two methods, according to the literature, as: quantitative research as reflecting a concern to follow the methods and procedures of the natural sciences, e.g. it is viewed as deductive approach and concerns with variables, causality, and so on; qualitative research could then be viewed as indicative of an approach that deliberately avoids the natural science approach and prefers, instead, to ground investigations in people's own understandings of social reality.

6.1.1.1. The Nature of Quantitative Research

Quantitative research is, then, a style which uses a special language which indicates some similarity to the ways in which scientists talk about how they investigate the **natural order** - variables, control, measurement, experiment. In order to examine the precise nature of the **scientific method** that forms the foundation of quantitative research, it is necessary so to refer to the notion of **'positivism'**. As Bryman (1988) summarizes:

> "**1)** Positivism involves a belief that the methods of the natural sciences are appropriate to the social sciences. This view involves a conviction that the fact that the objects of the social sciences - people - think, have feelings, communicate through language and otherwise, attribute meaning to their environment, and superficially appear to be uniquely different from one another in terms of their beliefs and personal characteristics - qualities not normally held to describe the objects of the natural scientist - is not an obstacle to the implementation of the scientific method (**'methodological naturalism'**) (von Wright, 1971; Giedymin, 1975).
>
> **2)** Positivism involves a belief that only those phenomena which are observable, in the sense of being amenable to the senses, can validly be warranted as knowledge. This means that phenomena which cannot be observed either directly through experience and observation or indirectly with the aid of instruments have no place

(**'phenomenalism'** or **'empiricism'**).

3) Positivism also suggests that scientific knowledge is arrived at through the accumulation of verified facts. These facts feed into the theoretical edifice pertaining to a particular domain of knowledge. Thus theory expresses and reflects the accumulated findings of empirical research. Such findings are often referred to as 'laws', that is, empirically established regularities (**'inductivism'**).

4) Scientific theories, therefore, provide a kind of backcloth to the empirical research in the sense that hypotheses are derived from them which are then submitted to empirical test. This implies that science is **'deductive'**, in that it seeks to extract specific propositions from general accounts of reality.

5) Also positivism is often taken to include a particular stance in relation to 'values' in two senses. The first is the more obvious sense of needing to purge the scientist of values which may impair his or her objectivity and so undermine the validity of knowledge. Clearly, within the domain of the social sciences, in which moral or political predispositions may exert a greater influence than in the natural sciences, this aspect of positivism has special relevance. The second is to draw a sharp distinction between scientific issues and statements on the one hand and normative ones on the other. Positivism denies the appropriateness of the sphere of the normative to its purview because normative statements cannot be verified in relation to experience. While positivists recognize that they can investigate the implications of a particular normative position, they cannot verify or falsify the position itself" (p. 15).

Hence, quantitative research influenced by a scientific method which has been interpreted in positivist terms is often conceptualized as having a logical structure in which theories determine the problems to which researchers address themselves. It is in the form of hypotheses derived from general theories. These hypotheses are assumed to consider causal connections between the concepts which are the elements of the hypotheses. Because concepts in the social sciences are believed to be abstract, there is a need to provide operational definitions to be measured. Data are collected by a social survey, experiment, or one of the other methods. Once the survey or experimental data have been collected, they are then analysed so that the causal connections which are specified by the hypothesis can be

verified or rejected. Then, the findings are resulted feed back into, and are absorbed by, the theory that set the whole process. It conceives of quantitative research as a rational, linear process. Figure (6.1), derived by Bryman (1988), captures some of the chief components of the typical account of the quantitative research process.

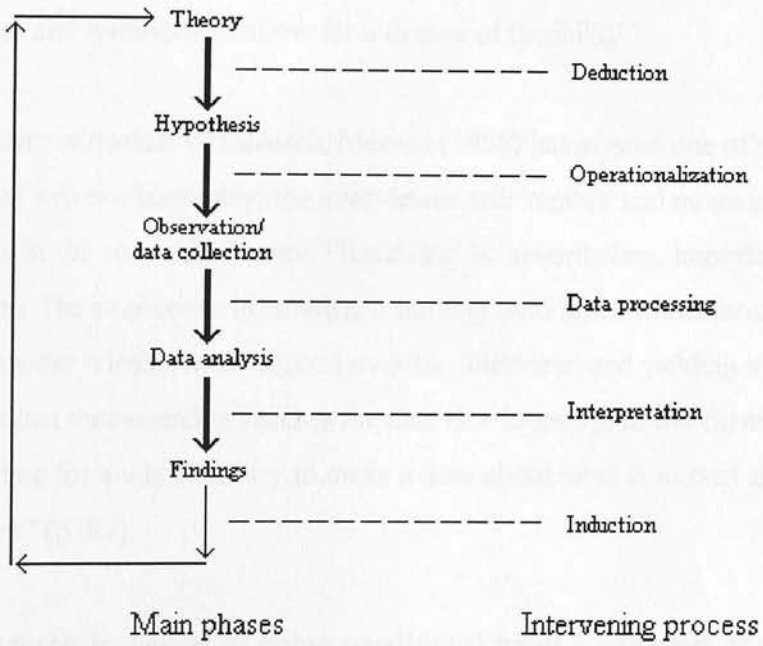


Figure (6.1) The Logical Structure of the Quantitative Research Process (Source: Bryman, 1988)

6.1.1.2. The Nature of Qualitative Research

Indeed, the debt owed by participant observers and qualitative researchers in general to anthropology can be discerned in the widespread use of the term 'ethnography' to describe their approach, a term coined in the context of anthropology to denote "literally, an anthropologist's **picture** of the way of life of some interacting human group" (Wolcott, 1975). The existence of such studies implies that qualitative research is not a new tradition, but one which has a history from the 1960s and has methods of data collection with which it is most closely associated. These methods have been summarized by Griffin (1985) as:

"1) **'Participant observation'**, which is probably the method of data collection;

2)**'Unstructured interviewing'**, in which the researcher provides minimal guidance and allows considerable latitude for interviewees;

3) **'Life history method'**, that has become a highly protracted unstructured interview in which the researcher induces others to reflect at length about their lives and the changes and processes which underpin their experiences; and

4) **'Group discussion methods'**, which were loosely structured around a series of key topics and questions to allow for a degree of flexibility."

To signify the nature of qualitative research, Measor (1985) has argued one of the properties of this method and writes: "Inevitably, the interviewee will 'ramble' and move away from the designated areas in the researcher's mind. 'Rambling' is, nevertheless, important and needs some investigation. The interviewee in rambling is moving onto areas which most interest him or her. The interviewer is losing some control over the interview, and yielding it to the client, but, the pay off is that the researcher reaches the data that is central to the client. I always go along with rambling for a while, but try to make a note about what is missed and cover it in the next interview" (p. 67).

Qualitative research is viewed as being predicated upon a prior set of assumptions about the study of social reality, in the same way that quantitative research is often characterised as deriving from a natural science understanding of how knowledge about the social world should be generated. The main intellectual undercurrents which tend to be viewed as providing qualitative research with its distinct epistemology are as bellow:

1) First, **'phenomenology'** is the immediate comprehension of the world by dense thicket of the prior understanding which is observer's subjective experience. "The phenomenologist views human behaviour... **as a product of how people interpret their world**. The task of the phenomenologist, and, the qualitative methodologist, is to capture this process of interpretation.... In order to grasp the meanings of a person's behaviour, the phenomenologist attempts to see things from that person's point of view" (Bogdan and Taylor, 1975). As Weber (1947) placed the word 'understanding' at the forefront of his own view of what sociology entailed: "Sociology... is a science which attempts the interpretive understanding

of social action in order to arrive at a causal explanation of its course and effects" (p. 90).

2) Second, **'symbolic interactionism'**, unlike phenomenology, is an explicitly social science approach to the study of social life. It has invariably been taken to conform to the emphasis on gaining access to people's interpretational schemes. People engage in activities that have meaning to them and they also create their own social realities (Matza, 1969).

3) Third, **'ethnogenic'** is an approach to construct hunches about the mechanisms which generate observed patterns and regularities in social actions. It aims to provide a framework for the examination of the genesis of such regularities. The ethnogenic approach is perceived by its advocates as providing a scientific framework for the analysis of social action.

And, at the end, a number of problems in the implementation of qualitative research will be addressed in its three cental aspects:

1) **'The problem of interpretation'**, i.e. the ability of the investigator to see through other people's eyes and to interpret events from their point of view;
2) **'The problem of the relationship between theory and research'** which qualitative researchers tend to espouse, and
3) **'The problem of generalization'**, i.e. the extend which qualitative research deriving from case studies can be 'generalized'.

6.2. Questionnaire

Out of the above discourse about quantitative and qualitative research, the following open-ended questionnaire was designed by the author. It askes people about likes and dislikes concerning their city, city centre and also other urban places. The current physical changes caused by the ring road round the Holly Shrine in the centre of the city of Meshed has caused many urban consequences. Meshed citizens have now initiated social changes because they have to live in an environment which is simbolically unfamiliar to them. **The aim of the questionnaire is to find out how people feel about their city and city centre. It also attempts to find out how they feel about changes**.

Questionnaire
1995

General description of responder **Code No:** .....

Name (no obligation): .....
Age: ..... Sex: .....
Occupation: .....
Educational status: .....
Address: .....
.....

Interviewer: .....
Date of interview: .....
Time start: ..... Time end: .....
Place of interview: .....
.....
.....

A. The City

1. Mention two features you most like about Meshed, please give two reasons why.
2. Mention two features you don't like about Meshed, please give two reasons why.
3. Mention two features you liked about Meshed which have now disappeared, please give two reasons why.
4. Mention two features you don't like about Meshed which have now disappeared, please give two reasons why.
5. Mention two changes you would like to see in Meshed's future, please give two reasons for each.
6. Mention two changes you wouldn't like to see in Meshed's future, please give two reasons for each.
7. Mention who you would like to make the changes.
8. Mention two ways in which you would like to participate in the improvement of the quality of life in Meshed.
9. Mention two ways in the past which increased people's contribution to the character of the city of Meshed, please give two reasons how they worked.
10. Mention two reasons why, nowadays, people cannot contribute to the character of of the city of Meshed.
11. Mention two ways in which future generations will know about the values and life of the people, please give two reasons how they work.
12. Mention two reasons why future generations will not know about the values and life of people, please give two reasons why.

C. The Place

13. Mention two important places in Meshed where it is easier to understand about the people, the city and the life in general, please give two reasons why they are important.
14. Mention two places in Meshed where you would tell visitors to visit, please give two reasons why they are important to be visited.
15. Mention one place in Meshed where you would mostly want to go, please give three reasons why.

D. The City Centre

16. Mention two important features you most like in Meshed City Centre, please give two reasons why you like them.
17. Mention two important features you dislike in Meshed City Centre, please give two reasons why you dislike them.
18. Mention three things that give identity to Meshed City Centre and you like, please give two reasons for each.
19. Mention three things that give identity to Meshed City Centre and you dislike, please give two reasons for each.
20. Mention two annual events which take place in Meshed City Centre which give its character and identity, please give two reasons for each.
21. Mention three things people usually do in their everyday life in the City Centre.
22. Mention two reasons why you go to the City Centre.
23. Mention three similar aspects or things you would find in your house and in the City Centre.
24. Mention two important aspects or features you think are necessary to be protected in the City Centre, please give two reasons for each.
25. Mention two important features, things or events you see on your way to the City Centre, please give one reason why they are important.
26. Mention two important admire changes which have been occurred recently in the City Centre and you like.
27. Mention two important changes which have been occurred recently in the City Centre and you dislike.
28. Mention two advantages of the ring road round the Holy Shrine, please give two reasons for each.
29. Mention two disadvantages of the ring road round the Holy Shrine, please give two reasons for each.
30. Mention two advantages of the open space and the parking area round the Holy Shrine, please give two reasons for each.
31. Mention two disadvantages of the open space and the parking area round the Holy Shrine, please give two reasons for each.
32. Mention two advantages of the under ground route round the Holy Shrine, please give two reasons for each.
33. Mention two disadvantages of the under ground route round the Holy Shrine, please give two reasons for each.
34. Would you like to say more about the City Centre?

(see Appendix 3 for more detailes)

Firstly, the questionnaire intends to understand the opinions and experiences of Meshed citizens about their urban life. Secondly, it includes a few general questions which invite their judgments and feelings about their city centre. This helps the researcher to get a better understanding of people's opinion on the notion of the city centre to find out how they feel

it affects their daily life. In most questions, the researcher asks for two or three different responses concerning the same topic providing more space for explaining the questioned subject. This helps the researcher to find out about the reasons for mentioning certain issues afterwards. The number of questions raised in 'positive' and 'negative' meanings are also equal.

6.2.1. The Characteristics of the Research

The most fundamental characteristic of the research can be categorized, according to the Bryman's classification of qualitative research, as:

1) **'Seeing through the eyes of the people'** is the main strategy of the research to view events, norms, values, etc. from the perspective of the people who are being studied.
2) **'Description'** is one of the main purposes of 'ethnographers' research style for providing detailed of the social settings which they investigate.
3) **'Contextualism'** is almost inseparable from another theme in the research, namely **'holism'** which intend to examine social entities as wholes to be explicated and understood in their entirely. Researchers can understand events only when they are situated in the wider social and historical context.
4) **'Process'** is both a symptom and cause of an undertaking to view social life inprocessual, rather than static terms. Participant observers have been very attuned to the notion of viewing social life as involving interlocking series of events and so tend to place a much greater emphasis on the changes that the processes which provide its bedrock are responsible for inducing.
5) **'Flexibility and lack of structure'** is the strategy of the research which is **relatively** open and unstructured, rather than one which has decided in advance precisely what ought to be investigated and how it should be done. The researcher tends to view the open approach, which allows her access to unexpectedly important invisible topics, as a way to help recognizing the irrelevance of the research question, from within the framework of the community, and the ability to change direction in the formulation of her problem.
6) **'Theory and concepts'** a general approach of the researcher to help her to be mistrustful of her specification prior to the start of the research enterprise. This is not

to say that a method like participant observation is incapable of testing theories and allowing concepts to be operationally defined at the outset of a qualitative study.

6.2.2. The Characteristics of the Respondents

The first step towards analysing people's responses is to sum up the information gathered and try to categorise them. This is the basis step for taking information out of the questionnaires which provide many responses in the first place. Having gathered the information it is so possible to go into more details and find out about the reasons of mentioning certain issues and then to discover how they correlate.

The researcher first starts interviewing people to fill the questionnaires personally. They are selected randomly from different age, sex and occupation groups. The study therefore could be considered as based on a statistical average. Table (6.1) shows the different age groups respondents. The first group of 19 to 35 indicates the youngest who have started their urban life within the new system of socio-spatial environment. The group 36 to 60 includes the people who have been educated under the Islamic urban environment and live now under the changed conditions. The third age group over 60, contains people who mainly have to suffer from the consequences of the environmental changes. They are confronted with unsatisfaction and social insecurity. However, these divisions can not be seen as very strict and rigid and may overlap depending on the individual.

Age Group	Female	Male	Total
19 - 35	5	7	**12**
36 - 60	3	9	**12**
Over 60	2	4	**6**
Total	**10**	**20**	**30**

Table (6.1) Different Age Groups

Respondents' occupation are also chosen from three different groups. The first group concerns people who are employed by the government. The second group who have their own business.

And the last group includes all adults without work, either retireds or housewives. Table (6.2) shows the number of males and females involved in the survey in different occupation groups.

Occupation	Female	Male	Total
Employed by Goverment	7	9	**16**
Own Business	_	6	**6**
Retired & Housewife	2	4	**6**
Student	1	1	**2**

Table (6.2) Different Occupation Groups

Respondents' education status are also chosen from different groups. The main three groups are: first who have higher education diploma; second who have secondary education diploma; and third who have primary education diploma. The researcher has also included people who have Quranic literacy and who have postgraduate degrees. Table (6.3) indicates the number of males and females in different educational groups.

Educational Status	Female	Male	Total
Higher (Postgraduate)	_	2	**2**
Higher (Undergraduate)	4	4	**8**
Secondary	4	10	**14**
Primary	1	3	**4**
Quranic Literacy	1	1	**2**

Table (6.3) Different Groups of Educational Status

After some exposure to the field setting and some collection of data, the researcher starts to develop 'categories' which illuminate and fit the data well (this will be discussed later in this chapter). Besides that **she starts to 'saturate' the categories, meaning that further instances of the categories are gathered until the researcher gets confidence**

about the relevance and range of the categories for the research setting. There is a recognition in the idea of 'saturation' that further search for appropriate instances may become a superfluous exercise (Turner, 1981). Therefore, the researcher stops interviewing and finishes the field setting after thirty questionnaires when she feels that the categories are saturated (see Appendix 4 for a sample of filled in questionnaire).

6.2.3. The Problem of Interpretation

About 'the problem of interpretation', i.e. the ability of the investigator to see through other people's eyes and to interpret events from their point of view, Ball's (1984) justification for giving less emphasis to this facet of school life is interesting. He says that access to a world of fleeting, overlapping, contradictory, murky, incoherent realities demands **selective attention from the field worker**. Hence, **for everything that is noticed, a multitude of other things are forgotten**. It is also said that there is **a tendency towards a descriptive approach to the use of 'data' in relation to conclusions or explanations in qualitative research**.

But, a more fundamental difficulty with respondent validation is **the nature of the linkage between the ethnographer's data** (i.e. interpretations of his or her subjects' world-views) **and the elaboration of those data for presentation to an academic audience**. As anthropologists like Geertz (1973) recognize, **ethnographers are engaged in interpretations of other people's interpretations**. It is unlikely that respondent validation will greatly facilitate the ethnographer's second-order interpretations of subjects' first-order interpretations (Bryman, 1988). So, **the researcher, the discipline, the culture** to be translated, and **the culture into which it is translated from an interwoven amalgam of elements**. The presentation of the natives' point of view can be viewed so as comprising three components:

1) The way in which the natives view the world;
2) The ethnographer's interpretation of how they view the world; and
3) The ethnographer's construction of his or her interpretation of the natives' view of the world for the ethnographer's own intellectual and cultural community.

From Bryman's (1988) point of view: "**Respondent validation may be of assistance with the second element, but not with the third**." Hence, **the delineation of theoretical ideas is usually viewed as a phase that occurs during or at the end of field-work, rather than being a precursor to it**. There are different approaches to the qualitative researcher's view of the linkage between **theory** and **investigation**. One of the most frequently cited of them is **'analytic induction'**, a term which was coined by Znaniecki (1934). The basic sequence of procedures is outlined in Figure (6.2).

	Chief Steps [after Robinson (1951)]
1)	Rough definition of the problem
2)	Hypothetical explanation of problem
3)	Examination of case(s) to determine fit with hypothesis
4)	If lack of fit, either (a) hypothesis is reformulated or (b) problem re-defined to exclude negative case
5)	Hypothesis is deemed to be confirmed after a small number of cases has been examined; negative cases require further re-formulation
6)	Procedure continues until no further negative cases have been encountered and a universal relationship has been established

Figure (6.2) Steps in Analytic Induction (Source: Bryman, 1988)

Also, the way in which the relationship between **theory** and **data** in qualitative research is often formulated is in terms of **'grounded theory'**, **an approach which draws on some of the basic components of analytic induction**. To identify the historical root of the idea of grounded theory Bryman (1988) writes that it was first formulated by Glaser and Strauss (1967) as **a means of generating theory which is embedded in data**.

6.3. Categories

As mentioned earlier, the main process involved in analysing people's responses and attitudes towards the topic raised in the questionnaire is to categorise and give order to the information gathered. This allows the researcher to extract valuable information from an ocean of

responses. After that, then, it can be possible to examine people's opinions in a greater detail. **The researcher therefore seeks to abstract a more general formulation of categories, as well as specifying the criteria for inclusion in those categories as following**:

6.3.1. The General Formulation of Categories (Criteria for Inclusion in Categories)

The principal issue with which the research will be concerned in questionnaire is that of connecting the notion of **human action** with **structural explanation** in **socio-spatial analysis**. The making of such a connection, an adequate account of human agency must situate action in *time* and *space* as a continuous flow of conduct. Hence, the major theme in order to show the interdependence of action and structure is the necessity to grasp the *time-space relations inherent in the constitution of all socio-spatial interaction.* An understanding of such socio-spatial systems as situated in time-space can be effected by regarding structure as non-temporal and non-spatial, as *a virtual order of differences* produced and reproduced in socio-spatial interaction as its medium and outcome. It appears that 'time', 'space' and 'virtual time-space' (or structure) - the threefold intersection of difference - are necessary to the constitution of the real.

Thus the term 'socio-spatial structure' tends to include two elements: the *patterning of interaction*, as implying relations between actors and elements; and the *continuity of interaction in time*. This indicates that the structure is concerned with the ordered relation of parts to a whole, with the arrangement in which the elements are linked together, and also the mode in which the relation between moment and totality expresses itself in reproduction. Therefore the latter one is distinct from that involves in the relation of 'parts' and 'wholes' in the co-ordination of actors and elements in socio-spatial systems. This comprises not only '*coherent functional socio-spatial programmes*' involving transmission of formative idea carried by instruction in time but also provides '*symbolic structured socio-spatial assumptions*' involving transmission of meaningful information carried by material structure over time. They are both consist of 'elements' and 'relations'. Hence the connection between three concepts of '*structure*', '*system*', and '*structuraton*' is stated at the outset as bellow:

'Structure': Rules and resources, organised as properties of socio-spatial systems.

'System': Reproduced relations between actors and elements, organised as regular socio-spatial practices.

'Structuration': Conditions governing the continuity or transformation of structures, and therefore the reproduction of socio-spatial systems.

Therefore, in our case, **'structural analysis'** involves examining the **'structuration of socio-spatial systems'**, or, studing the conditions in which those systems via the application of generative rules and resources are produced and reproduced in interaction. It means **'structure'** refers to **'structural socio-spatial properties'**, or more exactly, to **'structuring socio-spatial properties'**, providing the 'binding' of time and space carried by dynamic controls in socio-spatial systems. It emphasises that these properties can be understood as rules and resources, recursively implicated in the reproduction of socio-spatial systems.

The above statements so act as an abstraction of the general formulation of the categories as well as specifying the criteria for inclusion in those categories. These more general definitions then act as a guide for the researcher as well as stimulating further theoretical reflection. This stage, therefore, prompts her to think of further steps.

6.3.2. The Category of Dimensions

For the first step, all individual responses are divided into **a category of three different 'social', 'socio-spatial', and 'spatial' dimensions** to find out the number of times they are repeated throughout all the questionnaires. This is because of the principal issue with which the research is concerned: that of connecting the notion of human action with structural explanation in socio-spatial analysis. They are also divided into **'subject'/'object' category** to find out more about abstract issues as well as concrete ones to see the number of subjective and objective issues which are gathered in separate dimensions.

Table (6.4) indicates that even though most of the questions have been about the city, the city centre and generally other urban places, the results have been more concerned to abstract issues than concrete ones. And also, in spite of the fact that the main theme of the questionnaire has been generally about 'spatial' aspects of the city, people have also mentioned

many times 'socio-spatial' and particularly 'social' ones. This brings in researcher's mind that to what extent 'social' aspectts are more attractive than the others in the life of the city and the city centre. It also reminds the interdependency of 'social' and 'spatial' issues in any integrated 'socio-spatial' urban experiences like city centres.

	Subjects		Objects		Total
Social	Ideals Culture Social relations Traditional rituals People participation Respecting rules Crime ...	**564**	People Information People assosiations Urban experts Different goods Pilgrims Parents ...	**141**	**705**
Socio-spatial	Unity Arts Intellectuality Traditional urban life Immigration Feeling peace Shopping ...	**408**		**0**	**408**
Spatial	Urban changes Built environment Urban access Urban expansion Traditional textures Traffic Chaos ...	**647**	The Harem Monuments Public walks Ruined buildings Libraries Wide streets Markets ...	**217**	**864**

Table (6.4) The Total Number of Repeated 'Subjects' and 'Objects' in the 'Category of Dimensions'

It indicates that the ordering of space is really about the ordering of relations between people, and it is the fact of space that creates the special relation between function and social meaning. Taking the body of evidence, it seems impossible to follow assuming spatial form to be only a by-product of some determinative factor, such as climate, topography, technology or ecology. At the very least, **space seems to defy explanation in terms of simple social causes**.

6.3.3. The Category of Concepts

It is difficult to talk about spaces in terms of what they really are socially, specially when they

are mentioned as objects. As mentioned earlier it is eventually easier to talk about appearances and styles and to try to manufacture a socially relevant discourse out of surface properties. But, we need a way that within its analytic basis is able to describe not only systems with fundamental morphological divergencies, but also systems which vary from non-order to order, and from non-meaning to meaning. It can only refer to stucture.

Several attempts the researcher makes to develop a way concerned with the relation between society and its urban forms and also concerned with the environment as the human subject rather than an visible object. As a result, therefore, the focus of the research is shifted to the problem of describing the physical environment, with its differences and similarities from one place or time to another, as an understanding of how this relates to the patterns of use and social meaning. Within this respect, after sorting out the category of 'dimensions' and also the subjective/objective issues, again individual responses are grouped in the category of 'concepts'. **According to the theory of structurarion** (see Chapter 4 Section D on the process of space), **the seven different concepts of this category are defined and explained as** Figure (6.3).

A) Structure:	(Elements/Actors + Assumptions) - Structured Symbolic Assumptions - Setting Abstract Systems - Transmission of Meaningful Information Carried by Material Structure - Codes
B) Structural Properties:	(Elements/Actors + Programmes) - Structured Functional Programmes - Testing Concrete Systems - Transmission of Formative Idea Carried by Instruction - Messages
C) Elements/Actors:	Programmed Functional Elements/Actors
D) Relations:	Programmed Functional Relations
E) Structural Functions:	Programmed Coherent Functions Carried by Dynamic Controls
F) Sturcturation:	Structuring the Structure - Open-ended Hierarchical Autonomous Organized Levels of Authority of Elements/Actors
G) System:	Programmed Functional Time-dependent Systematic Interaction of Elements/Actors

Figure (6.3) The Category of Concepts (Source: The Author)

'Subjective' issues are distributed among **'six different concepts'**, whereas 'objective issues' are only titled as **'the concept of elements/actors'**. Table (6.5) shows the number of different

responses repeated in different conceptual groups. In fact, the direction of research suggests that the terms 'structure', 'system' and 'structuration' are all necessary concepts in socio-spatial investigations. To say that why a use could be found for such a notion, the researcher has to return to the theme of temporality. In some research traditions the attempt is made to exclude time (or more accurately, space-time intersections) from socio-spatial analysis, by the application of the synchrony/diachrony distinction. However, socio-spatial systems are 'taken out of time', and the attempt to bracket time is made in terms of 'taking a snapshot' of society in space, or 'freezing' it at an instant. The logical defects of such a view should be obvious, and it only retains whatever plausibility it has because of the implicit comparison that lies behind it.

Conclusively, the researcher distinguishes people's attitudes by understanding and refereeing their responses to:

A) Structure as:

Potential Generative Capacity (Elements/Actors + Assumptions)
[Knowledge or memory traces - the organic basis of human knowledgeability of 'how things are to be done'], such as *Islamic identity,* or *Urban identity*;

Structured Symbolic Assumptions
[Rules and resources, recursively implicated in the reproduction of systems - transmissible information], such as *Islamic beliefs* or *Values*;

Setting Abstract Systems
[Pattern of interaction, as implying relations between elements/actors; and the continuity of interaction in time], such as *Islamic architecture;*

Transmission of Meaningful Information Carried by Material Structure
[Function of storing Information - Sets of transformational relations], such as *Historic architecture* or *Past achievements*;

Codes
[Symbolic nature of the codes - 'virtual existence' as instantiated in action], such as *Ideals* or *Thoughts*.

B) Structural Properties as:

Realization of the potential Generative Capacity (Elements/Actors+ Programmes)
[Principle of organization - practices organized through the recursive mobilization of the knowledge], *such as Cultural identity*;

Structured Functional Programmes
[Transmissible instructions or programmes, organized as properties of systems], such as *Islamic*

culture;

Testing Concrete Systems
[How such patterns actually operate as systems], such as *Culture* or *Built environment*;

Transmission of Formative Idea Carried by Instruction
[Function of using information as instruction], such as *Instruction*;

Messages
[Elaborate system of elements/actors for translation symbolic codes], such as *Real life*.

C) Elements/Actors as:

Programmed Functional Elements/Actors
[Elements or actors by which or by whom rules and resources are drawn upon in the production of interaction], such as *People*, *Information* or *Monuments*.

D) Relations as:

Programmed Functional Relations
[Relations between moment and totality by which structure is expressed in reproduction. This relation is distinct from that involved in the relation of 'parts' and 'wholes' in the co-ordination of elements/actors in systems], such as *Social relations*, *Intellectuality and Accessibility*.

E) Structural Functions as:

Programmed Coherent Functions Carried by Dynamic Controls
[Structured features of systems stretching across space and time], such as *Traditional rituals* or *Modern life*.

F) Structuration as:

Structuring of Structure
[Conditions governing the continuity or transformation of structures, and therefore the reproduction of social systems], such as *People participation*, *Feeling peace* or *Traditional textures*;

Open-ended Hierarchical Autonomous Organized Levels of Authority of Elements/Actors
[Structuring of relations across space and time, in virtue of the structure as the medium and outcome of the conduct it recursively organizes], such as *Intellectual transformation*, *Settlement and permanency* or *City centre*.

G) System as:

Programmed Functional Time-dependent Systematic Interaction of Elements/Actors
[Reproduced relations between elements/actors, organized as regular practices - structured totality], such as *Respecting rules* or *Shopping*;

[Actual 'functioning' of relationships - 'patterns' of relationships only exist in so far as the latter are organised as systems, reproduced over the course of time], such as *Crime*, *Traffic* or *Chaos*.

It is possible, therefore, to see to what extent people have mentioned above conceptual terms. Evidently they have mentioned their attitudes about their city and their city centre related to all different concepts of the theory of structuration. Table (6.5) shows the total number of different issues gathered in different groups of the category of concepts.

		Examples	Responses
A)	**Structure: Structured Symbolic Assumption**	Islamic identity Ideals Unity Historic architecture Urban Identity ...	**124**
B)	**Structural Properties: Structured Functional Progrmmes**	Cultural identity Islamic culture Arts Built environment The small scale of city ...	**72**
C)	**Elements/ Actors**	People Information Urban executors The Holy Shrine of Imam Reza (A. S.) (The Harem) Monuments and traditional buildings ...	**358**
D)	**Relations**	Social relations State rules Intellectuality Accessibility Beauty and harmony ...	**299**
E)	**Structural Functions**	Traditional rituals Modern and mechanized urban life Urban expansion Withdrawal and regression of urban textures Circumambulation (going round) the Harem by car ...	**274**
F)	**Structuration**	Intellectual transformation People participation Feeling peace Responsibility Traditional textures ...	**394**
G)	**System**	Respecting rules an d duties Supporting and maintaing urban environment Shopping Traffic Chaos ...	**456**

Table (6.5) The Total Number of Different Responses Gathered in Different Groups of the 'Category of Concepts'

Taking the the body of evidence, the most repeated concept is the concept of 'system' - i.e. Group (G) - representing 'the structured totality' or the same 'the defining characteristic of the structure'. Groups (C), (D), (E) and (F) have similar value of numbers, but groups (A) and (B) have less than the others. For people, the conditions governing the continuity or transformation of the structure - either abstract or concrete - is very important, but, they have also mentioned many times the concepts of 'elements/actors' and 'relations'. Also, in spite of the fact that the questionnaire has asked *more* about physical and environmental issues, the number of responses with the concept of 'structure' and 'structural properties' - i.e. groups (A) and (B) - indicate the awareness of the people about problems related to abstract issues such as: *beliefs* or *culture*. They are all emerged from their ultimate ideals and desired values.

6.4. Correlation between Categories

Because the researcher should be sensitive to the connections between the emerging general categories and other milieux in which the categories may be relevant (Turner, 1981), **the correlation between the categories are examined as following**:

6.4.1. Concepts and Dimensions

Whereas different responses are gathered in terms of different dimensions very quickly and very directly, concepts have a more abstract nature. However, in this stage, the researcher attempts to find out how different concepts are related to different dimensions. Table (6.6) indicates the total number of different 'concepts' repeated in '*social*', '*socio-spatial*' and '*spatial*' dimensions.

On the top of the list of the top numbers there are: *'Spatial elements'*, *'Spatial relations'*, and also *'Systematic interaction of spatial elements'*. This indicates how people are aware of the important role of the both *'spatial elements'* and *'spatial relations'* and hence the result of *'time-dependent systematic interaction of spatial elements'*. Also, the next top numbers of responses are: *'Social actors'*, *'Social structuration'* and *'Social properties'* which indicate the important role of the people's presence in the *'structuration of social properties across space and time'* or the *'continuity and transformation of the social structure in reproducing social systems across space and time'*. Again, among the next top numbers, there are the serious

roles of *'social symbolic assumptions'* mentioning the *'ideal and abstract issues of the structure of the thought of the society'* and also the role of *'social'* and even *'socio-spatial'* *time-dependent systematic interaction of elements/actors* besides *'spatial'* one as mentioned before (Table 6.6).

		Social 705	**Socio-Spatial** 408	**Spatial** 864
1)	**Structure: Structured Symbolic Assumptions** 124	Islamic identiy Ideals Values Past achievments ... 95	Unity 1	Historic architecture Urban changes Islamic Architecture Urban identity ... 28
2)	**Structural Properties: Structured Functional Programmes** 72	Cultural identity Islamic culture Instruction Real life ... 51	Arts 1	Built environment The small scale of city 20
3)	**Elements/ Actors** 358	People Information Urban executors ... 141	0	The Holy Shrine of Imam Reza A.S. Monuments ... 217
4)	**Realtions** 299	Socialrelations State rules Islamic relations ... 61	Intellectuality Purity & spirituality Prosperity ... 86	Accessibility Beauty & harmony Organization ... 152
5)	**Strucutral Functions** 274	Traditional rituals Modern life National festivals ... 125	Immigration Modern urban life Urban life complexity ... 22	Urban expansion Withdrawal of traditional textures ... 127
6)	**Structuration** 394	Intellectual transformation People participation ... 134	Feeling peace Responsibility Attachment ... 140	Traditional textures City centre Ruined textures ... 120
7)	**System** 456	Respecting rules Crime Competition ... 98	Shopping Visiting people Sightseing ... 158	Traffic Chaos Pollution ... 200

Table (6.6) The Total Number of Different 'Concepts' Repeated in Different 'Dimensions'

6.4.1.1. Correlation of the Responses between the Concept of 'Structure' and 'Dimensions'

It was noticed before that symbolic principles have the potential to produce metaeffects by giving expression to personal and social identity that are signified in social programming. Such programme goals could be harnessed to bring about environmental behavior that may be at odds with individual instrumental purposes. Structural rules, therefore, can only be grasped in the context of the historical development of socio-spatial totalities, as recursively implicated in practices. But to know a rule, as Wittgenstein (1972) says, is to 'know how to go on', to know how to play according to the rule. This is vital, because it connects rules and practices. Rules generate - or are the medium of the production and reproduction of - practices. A rule is thus not a generalisation of what people do, of regular practices. But 'to know how to go on' is not necessarily, or normally, to be able to formulate clearly what the rules are. A child who learns English as a first language, when he or she can speak the language, knows the rules of English usage whether or not he or she can formulate any of them.

Wittgenstein's references to the rules of children's games are more illuminating in some key respects than discussions of games with fixed and determined rules like chess. He argues that the rules involved in most forms of life resemble the former more than they do the latter: "... remember that in general we don't use language according to strict rules - it hasn't been taught us by means of strict rules, either." In children's games, at least those which are practised by children's group themselves, or transmitted informally from generation to generation, there is no lexicon of formal rules, and it may be an essential characteristic of the rules which do exist that they cannot be strictly defined. Such is the case, Wittgenstein argues, with most of the concepts employed in ordinary language. We cannot clearly delimit them in a lexical sense: "... not because we don't know their real definition, but because there is no real 'definition' to them. To suppose that there must be would be like supposing that whenever children play with a ball they play a game according to strict rules". Wittgenstein concludes that **the operations of practical consciousness enmesh rules** *and* **the 'methodological' interpretation of rules is in the continuity of practices**. His conception of the interpretative work which is always temporally involved in accountability is very important here, ***chronically instantiation of rules which are not separate from what those rules 'are'***.

It is right thus when we speak of history as a type of code, and it is also right when we insist that it is not just a code like any other. For history, as an interpretation or analysis of the past, involves the application of a conceptual apparatus of some sort; while history as temporality, or the occurrence of events in time, is an inevitable feature of all social forms (Giddens, 1979). What is at issue is not just time, nor history, but also *historicity*: **Consciousness of 'progressive movement' as a feature of the social life of certain societies, in which that consciousness is organised actively to promote social change** (Ibid.).

In correlation A[1] (Table 6.7), the researcher gathers all the responses with the concept of 'structured assumptions'. They are referring to different assumptions (Figure 6.4): when 'individuals' are concerned with structured assumptions it is *social structure* and 'subjective'; when 'information' is concerned with structured assumptions it is *philosophic structure* and 'objective'; and finally when 'symbols' are concerned with structured assumptions it is *symbolic structure* and 'mediative'.

[Individuals] + [Assumptions] = Social Structure — *Subjective* *such as* *Society*
[Information] + [Assumptions] = Philosophic Structure — *Objective* *such as* *Thoughts*

[Symbols] + [Assupmtions] = Symbolic Structure

Mediative *'Surface'* *'Instrumental'* *such as* *Language*

Mediative *'Deep'* *'Ideal'* *such as* *Meaning*

Figure (6.4) Structures (Source: The Author)

Correlation A[1] represents all the responses with the concept of 'structure'. They are more 'social assumptions' (77%) in terms of *social structure*, *philosophic structure*, and *deep symbolic structure* than the others [*socio-spatial* (1%) and *spatial* (22%) assumptions]. In the 'social' dimension 51% of the responses are related to 'philosophic structure' (94% of which referring to Islamic beliefs) whereas 24% are related to 'social structure' and the remaining 25% to 'deep symbolic structure'. It means respondents have clearly put the 'philosophic structure' in the middle point of their concern. The next dimension, i.e. 'socio-spatial assumption', has only one response which emphasizes on unity (*deep symbolic structure*). And the next dimension, i.e. 'spatial assumptions', represents all the responses with the concept of *surface symbolic structure*, referring only to spatial artifacts (Table 6.7).

A[1]. Responses with the Concept of Structure (Structured Symbolic Assumptions)

Social Asumptions		Socio-spatial Assumptions		Spatial Assumptions	
Islamic & Shitte identity *(philosophic structure)*	21				
Ideals *(deep symbolic structure)*	15				
Islamic beliefs *(philosophic structure)*	10				
Historic identity *(social structure)*	8			Historic architecture *(surface symbolic structure)*	8
Islamic identity *(philosophic structure)*	7			Urban changes *(surface symbolic structure)*	7
Transmission of values *(deep symbolic structure)*	7				
History *(social structure)*	7				
Islamic originality *(philosophic structure)*	5				
National identity *(social structure)*	4			Islamic architecture *(surface symbolic structure)*	4
Thoughts *(philosophic structure)*	3			Urban texture changes *(surface symbolic structure)*	3
Social changes *(social structure)*	3			Urban identity *(surface symbolic structure)*	3
The Moslem faith *(philosophic structure)*	2			Physical changes *(surface symbolic structure)*	2
Values *(deep symbolic structure)*	2				
Past achievments (out of sight, out of mind) *(social structure)*	1	Unity *(deep symbolic structure)*	1	Lifeless architecture *(surface sybmolic structure)*	1
Total	77%		1%		22%

Table (6.7) The Number of Responses with the Concept of Transmission of Meaningful Information Carried by Material Structure [Setting Abstract Systems - (Elements/Actors + Assumptions)]

Social Assumptions:	**77%**	
Social Structure	24%	
Philosophic Structure	51%	(94% Referring to Islamic Beliefs)
Deep Symbolic Structure	25%	
Socio-spatial Assumptions:	**1%**	
Deep Symbolic Structure	100%	
Spatial Assumptions:	**22%**	
Surface Symbolic Structure	100%	

But, to assess the information properly it is necessary to find out if responses are mentioned in *positive* or *negative* context. In many cases, objects and subjects can contain positive and negative valuation. This has to be taken to consideration because they inform us of what people like and dislike. The researcher, therefore, arranges all the positive/negative responses

with the concept of 'structure' in correlation A[2] (Table 6.8). It shows what people like and dislike concerning the questioned subject. In 'social' dimension 73% of the responses are repeated in positive meanings, 45% of which with philosophic characteristics. The remaining 27% are repeated in negative meanings, 65% of which with philosophic characteristics.

A[2]. Positive & Negatine Responses with the Concept of Structure (Structured Symbolic Assumptions)

	Positive Meaning		**Negative Meaning**	
Social	Islamic & Shitte identity (21) *(philosophic strucutre)*	21		
	Ideals (15) *(deep symbolic structure)*	15		
	Historic identity (8) *(social structure)*	8	Lost Islamic beliefs (10) *(philosophic structure)*	10
	Transmission of values (7) *(deep symbolic structure)*	7	Lack of Islamic identity (7)	5
	History (7) *(social structure)*	6	Lost Islamic identity *(philosophic structure)*	2
	Islamic originality (5) *(Philosophic structure)*	5	Lost history *(social structure)*	1
	Thoughts (3) *(philosophic structure)*	3	Lost national identity (4)	2
	The Moslem faith (2) *(Philosophic structure)*	2	Lack of national identity *(social strucutre)*	2
	Values (2) *(deep symbolic structure)*	2	Social changes (3) *(social structure)*	3
			Lost past achievments (out of sight, out of mind) (1) *(social structure)*	1
Socio-spatial			Lost unity (1) *(deep symbolic structure)*	1
Spatial	Historic architecture *(surface symbolic structure)*	4	Lost historic architecture (8) *(surface symbolic structure)*	4
			Urban changes (7) *(surface symbolic structure)*	7
			Lost Islamic architecture (4) *(surface symbolic structure)*	4
			Lost urban identity (3)	2
			Lack of urban identity *(surface symbolic structure)*	1
			Urban texture changes (3) *(surface symbolic structure)*	3
			Physical changes (2) *(surface symbolic structure)*	2
			Lifless architecture (1) *(surface symbolic structure)*	1
Total		59%		41%

Table (6.8) The Number of Positive & Negative Responses with the Concept of Transmission of Meaningful Information Carried by Material Structure [Setting Abstract Systems - (Elements/Actors + Assumptions)]

Social Assumptions:	**77%**	
Positive Meaning	73%	(45% Referring to Philosophic Strucutre Assumptions)
Negative Meaning	27%	(65% Referring to Philosophic Structure Assumptions)
Socio-sptial Assumptions:	**1%**	
Negative Meaning	100%	
Spatial Assumptions:	**22%**	
Positive Meaning	14%	
Negative Meaning	86%	

It means, not only people have mentioned the philosophic characteristic of the social assumptions *more* than the others [i.e. 51% (Table 6.7)], but also they have *mostly* mentioned them in negative meanings [i.e. 65% (Table 6.8)]. Responses such as 'lost Islamic beliefs' or 'lack of Islamic identity' are some of those negative meanings. It again emphasizes that the Islamic philosophy plays an important part in Meshed's urban life. In the next dimension, i.e. 'socio-spatial assumptions', there is only one response, 'Unity', which is mentioned in negative meanings. But in the next one, i.e. 'spatial assumption', there are 14% of the responses with positive meanings and 86% with negative meanings. This represents that people are unhappy of their built environment.

The comparison between results shows that the process of environmental changes not only has caused many negative consequences on spatial structure of the city but also has had many negative influences on philosophic structure of the social life and social beliefs. There are significant comments which are mentioned very often. In the first place people have mentioned they love 'Islamic and Shiite identity'. They love also their 'ideals' and 'values'. They have put a good place for 'history' and 'historic identity' and even for the value of 'transferring Islamic values from past generations to future ones'. But, from the other other hand, nowadays they feel that there is a lack of 'Islamic identity' and even 'National identity' in their every day life. They refer to 'lost Islamic identity' and 'lost national identity' which for them means 'lost past achievements' (out of sight, so out of mind). They also feel there is a lack of unity between their social life and the symbolic material structure of the city. They have mentioned several times 'lost historic and Islamic architecture', 'lost urban identity' and 'lifeless architecture'. All these indicate the disadvantages of the current urban changes which have been occurred during recent years. These represent not only urban changes but also social changes. They show how people are aware of the changes, either physical or ideal. The changes which reflect again to environmental realities. Issues concerning 'spatial structure' are very crucial here that

the sense of 'social structure' suffers from it enormously. It is reasonable why there is only 14% positive responses with the concept of 'spatial structure' (Table 6.8).

In a sense, the survey represents how people feel about the process of transformation in the structure of the city and the structure of the city centre. People have been involved in the questionnaires and the survey shows that Meshed's citizens are interested in what is going on. Generally mentioned by people of all age, education and occupation groups show a clear opinion about fabric changes which is concerned to social changes and concequently to ideal changes. The consequence again is reflected to environmental affairs.

It can be also said that the Islamic philosophy has a central and significant role in terms of social structure as well as spatial structure. Asked in the questionnaire for positive and negative subjects concerning the time before and after fabric changes people mainly focus on Islamic issues. They are quite aware of the values of the advantages of their Islamic architecture. The sense of community is considered as a major advantage of a Islamic society which has an Islamic urban identity.

Conclusively, when respondents were asked about problems in general, the older generations who have had Islamic attitudes concerning social life in general and urban life in particular are used to the habit of welcoming problems. But, younger generations are afraid of the situation and have no idea how the problems can be solved. Who have not yet experienced an Islamic urban environment have no idea how life can be better, they are very pessitimistic. This is also an additional concern which has recently become crucial in the structure of Meshed's society.

6.4.1.2. Correlation of the Responses between the Concept of 'Structural Properties' and 'Dimensions'

About how all these changes happen, the researcher would like to mention that **structure** can only be understood as ordered in terms of the **mediation** and **transformation** in the **spatial-temporal constitution of social systems**. The most basic sense of mediation is that involved in the 'binding' of space and time themselves, the very essence of social reproduction. The binding of space and time can be understood in terms of what can be called the 'presence

availability' of actors within social systems. **All social interaction involves mediation in so far as there are always 'vehicle' that 'carry' social interchange across spatial and temporal gaps**. In societies or communities of high-presence availability - in other words, where interaction is predominantly of a face-to-face kind - the mediation vehicles are those supplied by the faculties of physical presence. Writing and other media of communication (telephone, television, mechanised modes of transportation) bind another kind - but much greater distances - in space and time.

The argument is that "there are no such things as rules of transformation: all social rules (codes and norms) are transformational" (Giddens, 1979). **To say that rules are transformational is to say that they generate an indefinite range of empirical contents, which have an identity with one another only in respect of their relation to those rules**. While this may be obvious enough in respect of codes and norms, it is perhaps not so clear how resources involve either mediations or transformations. **For resources might seem to exist in a spatial-temporal sense, in a way in which rules do not**. As Giddens says, the material existents involved in resources (a) are the content, or the 'vehicles', of resources in a parallel manner to the 'substance' of codes and norms, and (b) as instantiated in relations in social systems, only operate in conjunction with codes and norms. The transformational character of resources is just as basic as that of rules: which is why we employ the term **'transformational capacity'** as an intrinsic feature of human agency. Resources, however, provide the *material levers* of all transformations of empirical contents, including those involved in the operation of codes and norms.

The notions of transformation and mediation do not only apply to the structuring of interaction in real space-time, they are also essentially involved in analysing structures themselves. When mediation and transformation are taken together, they can be said to concern the *convertibility* of rules and resources (Giddens, 1979). The study of structures, therefore, is always the study of *structuration*. The caution that Eco, quoted by Giddens, counsels about the notion of code is very useful here: "One can ... maintain that it is not true that a code organises signs; it is more correct to say that codes provide the rules which *generate* signs as concrete occurrences in communicative intercourse. Therefore **the classical**

notion of 'sign' *dissolves* itself into a highly complex network of changing relationships."

Thus the identification of socio-spatial structures can in no sense be regarded as the only aim of socio-spatial investigation. The instantiation of structure in the reproduction of socio-spatial systems, as its medium and outcome, is the proper focus of socio-spatial analysis. In this context we can identity structural elements as structural principles that are most deeply imbedded in space-time dimensions of socio-spatial systems. Such structural principles govern the basic institutional alignments in a society.

All socio-spatial reproduction is, therefore, grounded in the knowledgeable application and reapplication of rules and resources by actors in situated socio-spatial contexts: all interaction thus has, in every circumstance, to be contingently 'brought off' by those who are party to it. **Change is in principle involved with socio-spatial reproduction - again in both its basic sense and in its 'generational' sense - in its very contingency**: socio-spatial systems are chronically produced and reproduced by their constituent participants. **Change, or its potentiality, is thus inherent in all moments of socio-spatial reproduction. It is essential to see that any and every change in a socio-spatial system logically implicates the totality and thus implies structural modification, however minor or trivial this may be.**

In the correlation B[1] (Table 6.9), the researcher gathers all the responses with the concept of 'structural properties'. They are referring to different properties: when referring to the *subjective institutional properties* it is 'individuals' who are concerned with instantiated programming; when referring to the *objective strategic properties* it is 'information' which is concerned with instantiated programming; and finally when referring to the *mediative symbolic properties* it is 'symbols' which are concerned with those programming (Figure 6.5).

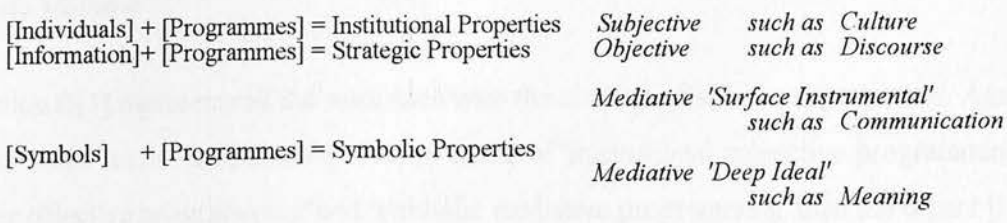


Figure (6.5) Structural Properties (Source: The Author)

B[1]. Responses with the Concept of Structural Properties (Structured Functional Programming)

Social Programming		**Socio-spatial Programming**		**Spatial Programming**	
Cultural changes *(institutional, subjective)*	12			Built environment *(symbolic mediative)*	10
				The small scale of city *(symbolic mediative)*	10
Cultural identity *(institutional, subjective)*	9				
Writings *(linguistic symbolic mediative, literary)*	9				
Mass media (technical) *(linguistic symbolic mediative, technical)*	6				
Islamic culture *(institutional, subjective)*	5				
Chest to chest (verbal) *(linguistic symbolic mediative, verbal)*	4				
Cultural heritage *(institutional, subjective)*	1	Arts *(artistic symbolic mediative)*	1		
Different cultures *(institutional, subjective)*	1				
Discourses *(strategic, objective)*	1				
Connection between generations *(institutional, subjective)*	1				
Instruction *(institutional, subjective)*	1				
Real life *(institutional, subjective)*	1				
Total	71%		1%		28%

Table (6.9) The Number of Responses with the Concept of Transmission of Formative Idea Carried by Instruction [Testing Concrete Systems - (Elements/Actors + Programmes)]

Social Programming:	**71%**	
Institutional Subjective	60%	(90% Referring to Culture)
Strategic Objective	2%	
Symbolic Mediative (linguistic)	38%	
Socio-spatial Programming:	**1%**	
Symbolic Mediative	100%	
Spatial Programming:	**28%**	
Symbolic Mediative	100%	

Correlation B[1] represents all the responses with the consept of structural properties. Again they are more 'social properties' (71%) in terms of 'institutional subjective programming', 'strategic objective programming' and 'symbolic mediative programming' than the others [i.e. socio-spatial (1%) and spatial (28%) properties]. In the 'social' dimension 6o% of the

responses are related to 'institutional programming' (90% of which referring to culture) whereas 2% are related to 'strategic programming' and the remaining 38% to 'symbolic programming' (100% of which referring to liguistic programmes). Respondents have clearly put the 'institutional subjective programming' in the middle point of their concerns. The 'socio-spatial' dimension has only one response which emphasizes on arts (i.e. 'symbolic mediative programming'). And, also, the 'spatial' dimension represents all the responses with the concept of 'symbolic mediative programming', referring only to spatial properties.

But, to assess the information properly it is necessary to find out if responses are mentioned in positive or negative meaning. The researcher arranges all the positive/negative responses with the concept of 'structural properties' in correlation B[2] (Table 6.10). In the 'social' dimension 59% of the responses are mentioned in positive meanings, 32% of which have institutional characteristics. The remaining, i.e. 41% of the responses, are mentioned in negative meanings, 100% of which have institutional characteristics. Therefore, not only people have mentioned the institutional characteristics of social programming *more* than the others [i.e. 60% in Table (6.9)], but also they have *mostly* mentioned them in negative meanings [i.e. 100% in Table (6.10)]. Responses such as 'cultural changes' or 'lack of cultural identity' are most of them. It again emphasizes that in what extend the Islamic culture plays an important part in Meshed's urban life.

In the next dimension, i.e. 'socio-spatial programming', there is only one response, 'arts', which has itself positive meaning. But in the next dimension, i.e 'spatial programming', 50% of the responses are repeated in positive meanings and the remaining 50% in negative meanings. This represents people's awareness of spatial properties (Table 6.10). The process of spatial instantiation of environmental programming not only has caused negative consequences on spatial structure of the city but also has had many negative influences on institutional instantiation of its social programming.

As *culture* refers to beliefs and values, or a set of rules about how to behave and how to do things, it is used to indicate that it is shared among society in a consensual way. But a society's values, beliefs and practices involve more than mental and behavioural sharing processes, and

culture also appears in the built environment. It is also the spatial programming of the environment which emerges from the social programming of the society. But, as culture is the readily observable regularity of the behaviour in terms of the structural instantiation of the society, *social structure* is the set of rules and resourses of the behaviour inferred to account of this observed regularity. Therefore, as we cannot limit the aim of the study only with focus on structural rules of the society without examining the directly observable regularity of cultural instantiation of that society in social practice, we cannot also limit the aim of the spatial study of the city with only focus on structural rules of the space without examining the directly consequences of the cultural instantiation of the space in the context of the socio-spatial practice. As structure only exist as structural properties - as *culture* - the main question is how a built form as a spatial property actually operates in every day practice.

B[2]. Positive & Negative Respnses with the Concept of Structural Properties (Structured Functional Programming)

	Positive Meaning		**Negative Meaning**	
Social	Writings (9) *(linguistic symbolic mediative, verbal)*	9	Cultural changes (12) *(institutional subjective)*	12
	Cultural identity *(institutional subjective)*	3	Lack of cultural identity (9) *(institutional subjective)*	6
	Mass media (6) *(liguistic symbolic mediative, technical)*	6		
	Islamic culture (5) *(institutional subjective)*	5		
	Chest to chest (4) *(linguistic symbolic mediative, verbal)*	4	Different cultures (1) *(institutional subjective)*	1
	Discourses (1) *(strategic objective)*	1	Lack of connection between generations (1) *(institutional subjective)*	1
	Instruction (1) *(institutional subjective)*	1	Lack of cultural heritage (1) *(institutiona subjective)*	1
	Real life (1) (institutional subjective)	1		
Socio-spatial	Arts (1) *(artistic symbolic mediative)*	1		
Spatial	Built environment (10) *(symbolic mediative)*	10	Lost small scale of city (10) *(symbolic mediative)*	10
Total		57%		43%

Table (6.10) The Number of Positive & Negative Responses with the Concept of Transmission of Formative Idea Carried by Instruction [Testing Concrete Systems - (Elements/Actors + Programmes)]

Social Programming:	**71%**	
Positive Meaning	59%	(32% Referring to Institutional Subjective Programmes)
Negative Meaning	41%	(100% Referring to Institutional Subjective Programmes)
Socio-spatial Programming:	**1%**	
Positive Meaning	100%	
Spatial Programming:	**28%**	
Positive Meaning	50%	
Negative Meaning	50%	

6.4.1.3. Comparison between Responses with the Concepts of 'Structure' and 'Structural Properties'

By referring to Figures (6.4) and (6.5), Table (6.11) shows the differences between two concepts of 'structure' and 'structural properties'. It indicates; when the first is *structured information* the second is *functional instruction*; or when the first is the *potential generative capacity* the second is the *realization of the potential generative capacity*; and again when the first is *generating hypothesis about the environment* the second is *testing hypothesis about the environment*; and so on.

Therefore, when in the 'structural hierarchy' there is *an ordered collection of rules*, in the 'functional hierarchy' there is *an internal representation of the system's own dynamic*, or in a same theme, when in the first one there is *a system of rules*, in the second one there is *an autonomous systematic representation of elements/actors in implying alternative ways of representing of system*.

In the first column of the bottom of the Table (6.11) all the responses with the concept of 'structure' are gathered. They are more mentioned in social dimension than socio-spatial and spatial ones. They are also more referred to 'philosophic structure' than the others in social dimension (see also Figure 6.4). It means that the important theme is the repeated number of the 'philosophic structure' with 94% referring to Islamic beliefs. It is also recognizable that not only people have mentioned the philosophic characteristic of the social structure *more* than the others, but also they have mentioned it *mostly* in negative meanings. Therefore people have clearly put the philosophic characteristic of the social structure in the middle point of their answers. Responses such as 'lost Islamic beliefs' or 'lack of Islamic identity' are some examples of the negative meanings. **It emphasizes how Islamic philosophy plays an important part in Meshed's urban life**. Also in the other dimensions, most of the responses

are mentioned in negative meanings. Actually **the process of environmental changes not only has caused many negative physical consequences but also has had many negative philosophic influences on the structure of the thought of the society**.

In the next column of the bottom of the Table (6.11), also, all the responses with the concept of 'structural properties' are gathered. They are more mentioned in social dimension than socio-spatial and spatial dimensions. They are also more referred to 'institutional properties' than the others in social dimension (see also Figure 6.5). It means that the important theme is the repeated number of 'institutional properties' with 90% referring to Islamic culture. Also in this dimension, not only people have mentioned the institutional characteristic of the social properties *more* than the others, but also they have *mostly* mentioned them in negative meanings. Therefore people have clearly put the institutional characteristic of the structural properties in the middle point of their answers. Responses such as 'cultural changes' or 'lack of cultural identity' are some examples of those negative meanings. It again emphasizes to what extent the Islamic culture plays an important part in Meshed's urban life. In other dimensions also people are 50% unhappy with the spatial properties of their built environment.

Structure (Structured Assumption)			**Structural Properties (Structured Programme)**		
'Structured Information' 'Potential Generative Capacity' 'Setting Hypothesis about the Environment' 'Symbolic Genotypic' 'Storing Information' 'Deterministic'			'Functional Instruction' 'Realization of the Potential Generative Capacity' 'Testing Hypothesis about the Environment' 'Elaborately Systematic' 'Using Information' 'Non-deterministic' 'Conditional Character'		
Social:	**(77%)**		**Social:**	**(71%)**	
Social (e.g. History)	24%		Institutional (e.g. Culture)	60%	90% Islamic culture
Phylosophic (e.g. Thoughts)	51%	94% Islamic Beliefs	Strategic (e.g. Discourses)	2%	
Deep Symbolic (e.g. Values)	25%		Symbolic (e.g. Writings)	38%	
Positive Meaning:	73%	45% Philosophic	Positive Meaning:	59%	32% Institutional
Negative Meaning:	27%	65% Philosophic	Negative Meaning:	41%	100% Institutional
Socio-spatial:	**(1%)**		**Socio-spatial:**	**(1%)**	
Symbolic (e.g. Unity)	100%		Symbolic (e.g. Arts)	100%	
Positive Meaning:	0%		Positive Meaning:	100%	
Negative Meaning:	100%		Negative Meaning:	0%	
Spatial:	**(22%)**		**Spatail:**	**(28%)**	
Symbolic (e.g. Urban Identity)	100%		Symbolic (e.g. Built Environment)	100%	
Positive Meaning:	14%		Positive Meaning:	50%	
Negative Meaning:	86%		Negative Meaning:	50%	

Table (6.11) The Comparison between Responses with the Concept of Structured Assumptions and the Concept of Structured Programmes

Table (6.11) shows in what extend the results are nearly the same except with a main difference. In the concept of 'structure' the important theme is *philosophic issues* (51%) against *social ones* (24%), whereas in the concept of 'structural properties' the main theme is *institutional issues* (60%) against *strategic ones* (2%). **They represent the important role of the structure of the thought of the society beside the institutional role of the people**. In other words, **it is progressive individualization resulting from progressive centralization that certain individuals gain a dominant role and so determining the behaviour of the whole society**.

6.4.1.4. Correlation of the Responses between the Concept of 'Elements/Actors' and 'Dimensions'

About the debate over methodological **individualism** in **social theory** Giddens (1979) states: "... **institutions** do indeed 'result' from human agency: but **they are the outcome of action only in so far as they are also involved recursively as the medium of its production**. In the sense of 'institution' therefore, **the 'collective' is bound to the very phenomenon of action**." He distinguishes 'institution' from 'social system' or 'collectivity'. Institutions, to quote Radcliff-Brown (1940), may be regarded as 'standardised modes of behaviour' which play a basic part in the space-time constitution of social systems. **The standardisation of behaviour in space-time involves its chronic reconstitution in contingent contexts of day-to-day social activity**.

It is clear that much work on the psychological development of **'the individual'** is deficient as an account of socialisation, in so far as the overriding focus is upon the differentiation of personality within an undifferentiated 'society'. This is true also in some considerable degree of the theory that has long dominated child psychology in respect of cognitive development: that associated with Piaget. Certain issues have to be particularly borne in mind if we are to avoid the shortcoming of such conceptions. We have to recognise that 'becoming social' cannot be understood as a series of competencies simply 'stored' in the learner (Bruner, 1974). Rather, becoming social involves, on the level of cognition, mastery of the 'dialogical' contexts of communication. Such mastery is by no means wholly discursive, but involves the **accumulation of practical knowledge of the conventions drawn upon in the production**

and reproduction of social interaction. Moreover, it will not do just to emphasize that the child is an active participant in processes of socialisation, important as that is, and leave matters there. In understanding why, it is helpful to notice **the close connection between 'socialisation' and the conception of production and reproduction to society**. Socialisation only sounds a rather special, distinctive term, emphasizing **process** and **time**, if employed in the way Giddens has previously disclaimed, where society is treated as a static form, into which the individual is progressively incorporated. He explains that **the unfolding of childhood is not time elapsing just for the child**: **it is time elapsing for its parental figures, and for all other members of society**; **the socialisation involved is not simply that of the child, but of the parents and others with whom the child is in contact in the continuity of interaction** (Giddens, 1979). Socialisation is thus most appropriately regarded not as the 'incorporation of the child into society' but as the *succession of the generations.*

But, when we are talking about **'spatial elements'**, cities may be comparable to other artefacts in that they assemble elements into a physical object with a certain form; but they are incomparable in that they also create and order the empty volumes of space resulting from that object into a pattern. Mentioned by Hillier et al. (1984), cities are not just objects, but transformations of space through objects: "There is never any doubt that the artefact does belong to two realms. Invariably, artefacts are both functional and meaningful. Insofar as they are the first, they are of practical use; insofar as they are the second, they are of primarily social use, in that they become **a means by which cultural identities are known and perpetuated**." It is the fact of space that creates the special relation between function and social meaning. The ordering of space in cities is really about the ordering of purposeful relations between people. Because this is so, society enters into the very nature and form of cities. "They are social objects through their very form as objects" (Ibid.).

However, in spite of considerable divergences, many approaches seem to sidestep the central problem of city: they do not first conceptualise cities as carrying social determination through their very form as objects. They characteristically proceed by separating out the problem in two ways: (1) **they separate out the problem of meaning** - the time-dependent self-ideal process of pursuing purposeful social relations that in which space functions as an intrinsic

aspect of social programming'- **from the intrinsic material nature of the artefact** - the time-dependent self-conscious process of transmitting meaningful information that in which space is the function of the principles of social programming', *that is, they treat it as an ordinary artefact rather than as a city*; and (2) **they separate out a human subject** - reorganization of social practices across space and time for generating rules of social programming (*principles of social structure*) - **from an environmental object** - reorganization of spatial choices across space and time for generating symbolic rules of spatial programming for transferring more useful information' (*principles of spatial structure*) and identify *the problem as one of understanding a relation between human beings and their built environment*. To quote Hillier et al. (1984) the effect of both shifts is the same. They move us from a problem definition in which a city is an object whose spatial ordering has itself a certain social logic to it, into one in which the physical environment has no social content and society has no spatial content, **the former being reduced to mere inert material, the latter to mere abstraction**. In fact, the problem is that in both levels they only see the *spatial elements* and ignore the *relations* between elements - the principles, as organized by structual rules in the movement of time.

In the correlation C[1] (Table 6.12), the researcher gathers all the responses with the concept of elements/actors. It is recognizable when referring to *subjects* they are two kinds: 'institutional individuals' and 'non-institutional individuals'; and when referring to objects they are also two kinds: 'strategic information' and 'non-strategic information'; and finally when referring to *elements* they are also two kinds 'symbolic elements' and 'instrumental elements' (Figure 6.6).

[Individuals] *in* [Deep Ideal Programming] = [Institutional Subjects] *such as People*
[Individuals] *in* [Surface Instrumental Programming] = [Non-institutional Subjects] *such as Experts*

[Information] *in* [Deep Ideal Programming] = [Strategic Objects] *such as End*
[Information] *in* [Surface Instrumental Programming] = [Non-strategic Objects] *such as Means*

[Elements] *in* [Deep Ideal Programming] = [Symbolic Elements] *such as Traditional Buildings*
[Elements] *in* [Surface Instrumental Programming] = [Instrumental Elements] *such as Modern Buildings*

Figure (6.6) Programmed Elements/Actors (Source: The Author)

C[1]. Responses with the Concept of Elements/Actors

Social Actors		Socio-spatial		Spatial Elements	
People *(institutional subject)*	33			The Harem *(element in the centre)*	78
Information *(strategic object)*	19			Monuments &traditiona buildings *(element in the centre)*	32
Money *(symbolic mediate)*	16				
Urban executors (municipality) *(non-institutional subject)*	14			Ruined places & buildings *(element in the centre)*	13
People associations *(institutional subject)*	13			Natural beauties *(element)*	13
Urban experts *(non-institutional subject)*	12			Public walks *(element in the centre)*	12
Different & special goods *(symbolic mediate)*	9			Open spaces *(element in the centre)*	9
Seosonal pilgrims *(institutional subject)*	7			Madareses & universities *(element in the centre)*	7
				Libraries *(element in the centre)*	7
				Buildings & offices *(element in the centre)*	6
				Underground road round the Harem *(element in the centre)*	6
Pilgrims *(institutional subject)*	5			Religious centres & mosques *(selement in the centre)*	5
				Parking areas *(element in the centre)*	5
				Wide streets *(element in the centre)*	5
Astan Quds *(non-institutional subject)*	4				
Relatives *(institutional subject)*	4				
Parents *(institutional subject)*	3			Working places *(element in the centre)*	3
				Markets *(element in the centre)*	3
				Public places *(element in the centre)*	2
				Home & school *(element)*	2
				Museums & exhibitions *(element in the centre)*	2
				Coffee shops & different shops *(element in the centre)*	2
Different groups of people *(institutional subject)*	1			Small spaces *(element in the centre)*	1
Governers & foreign guest visitors *(non-institutional subject)*	1			Resting places *(element in the centre)*	1
				Guest houses *(elemnet in the centre)*	1
				Main streets *(element in the centre)*	1
				Thin streets *(element in the centre)*	1
Total	39%		0%		61%

Table (6.12) The Number of Responses with the Concept of Programmed Functional Elements/Actors

Social Actors:	**39%**	
Institutional Subjects	47%	
Non-institutional (Instrumental) Subjects	22%	
Strategic Objects	13%	
Symbolic Mediates	18%	
Spatial Elements:	**61%**	
Elements	100%	(93% Located in the Centre)

Correlation C[1] (Table 6.12) represents all the responses with the consept of elements/actors. They are less 'social actors' (39%) than 'spatial elements' (61%). Of course there is no socio-spatial column in this correlation. In the 'social' column, 47% of the responses are related to 'institutional subjects', 22% to 'non-institutional subjects', 13% to 'strategic objects' and the remaining 18% to 'symbolic mediats'. Respondents have clearly put the 'institutional subjects' in the middle point of their answers. **The 'spatial' column also represents all the responses with the concept of 'symbolic elements', more referring to those which have been located in the city centre**.

C[2]. Positive & Negative Responses with the Concept of Elements/Actors

	Positive Meaning		Negative Meaning	
Social	People (33) People's presence *(institutional subject)*	8 19	Lack of people's presence *(institutional subject)*	6
	Information (19) *(strategic object)*	17	Lack of information *(strategic object)*	2
			Lack of competent urban executors (municipality) (18) *(non-institutional subject)*	18
			Boghet limitation (16) *(symbolic mediate)*	16
	People associations *(institutional subject)*	3	Lost people associations (13) Lack of people associations *(institutional subject)*	6 4
			Lack of competent urban experts (12) Lost competent urban experts *(non-institutional subject)*	9 3
	Different & special goods (9) *(symbolic mediate)*	9		
	Seosonal pilgrims (7) *(institutional subject)*	7		
	Pilgrims (5) *(institutional subject)*	5		
	Relatives (4) *(institutional subject)*	4		
	Parents (3) *(institutional subject)*	3		
	Different groups of people (1) *(institutional subject)*	1	Governers & foreign guest visitors (1) *(non-institutional subject)*	1
Socio-spatial				

Table (6.13) The Number of Positive & Negative Responses with the Concept of Programmed Functional Elments/Actors

C[2]. Positive & Negative Responses with the Concept of Elements/Actors (continued)

	Positive Meaning		Negative Meaning	
Spatial	The Harem (The Holy Shrine of Imam Reza A.S. (78) *(element in the centre)*	78		
	Monuments & traditional buildings (32) *(element in the centre)*	22	Lost monuments & traditional buildings *(element in the centre)*	10
	Public walks (12) *(element in the centre)*	10	Lack of public walks *(element in the centre)*	2
	Lost ruined places & buildings(13) *(element in the centre)*	9	Ruined places & buildings *(element in the centre)*	4
	Open spaces *(element in the centre)*	4	Useless open spaces (9) *(element in the centre)*	5
	Madares & universities (7) *(element in the centre)*	7		
	Natural beauties (13) *(element)*	13		
	Libraries(7) *(element in the centre)*	7		
			Underground road round the Harem (6) *(element in the centre)*	6
	Building & offices (6) *(element in the centre)*	6		
			Incompetent parking areas (5) *(element in the centre)*	5
	Religious centres & mosques (5) *(element in the centre)*	5		
			Wide streets (5) *(element in the centre)*	5
	Working places (3) *(element in the centre)*	3		
	Markets (3) *(element in the centre)*	3		
	Home & school (2) *(element)*	2		
	Public places (2) *(element in the centre)*	2		
	Museums & exhibitions (2) *(element in the centre)*	2		
	Coffee shops & different shops (2) *(element in the centre)*	2		
	Lost small spaces (1) *(element in the centre)*	1	Lack of resting places (1) *(element in the centre)*	1
	Guest houses (1) *(element in the centre)*	1		
	Main streets (1) *(element in the centre)*	1		
	Thin streets (1) *(element in the centre)*	1		
Total		71%		29%

Table (6.14) The Number of Positive & Negative Responses with the Concept of Programmed Functional Elements/Actors (continued)

Social Actors:	**39%**		
Positive Meanings	54%	66% Institutional Subjects	
		22% Strategic Objects	
		12% Symbolic Mediates	(100% Referring to Goods)
Negative Meanings	46%	25% Institutional Subjects	
		47% Non-institutional (Instrumental) Subjects	
		3% Strategic Objects	
		25% Symbolic Mediates	(100% Referring to Money)

Spatial Elements:	**61%**	
Positive Meanings	82%	92% Located in the Centre
Negative Meanings	18%	100% Located in the Centre

Again the researcher arranges all the positive/negative responses with the concept of 'elements /actors' in the correlation C[2] (Tables 6.13 and 6.14). In the 'social' dimension 54% of the responses are mentioned in positive meanings referring to different characteristics: 66% 'institutional subjective'; 22% 'strategic objective'; and 12% 'symbolic mediative'. Also, again 46% of the total responses are mentioned in negative meanings referring to different characteristics: 25% 'institutional subjective'; 47% 'non-institutional subjective'; 3% 'strategic objective'; and finally 25% 'symbolic mediative'. Therefore, people have mentioned *several times* (i.e. 66%) the 'institutional subjective' character of the responses in positive meanings and even 25% in negative meanings, but they have mentioned all the 'non-institutional subjective' character of the responses (i.e. 47%) in negative meanings. Again **it emphazises in what extend 'institutional subjects' and even 'non-institutional subjects' play an important part in Meshed's urban life**. There are also a limited number of 'strategic objects' (3%) in negative meanings which 'lack of information' covers most of those responses.

The dimension of 'spatial elements' also represents 82% of the responses with positive meanings, 92% located in the centre; and the remaining 18% with negative meanings, 100% located in the centre. People's awareness of the city centre's spatial elements is the main point which the researcher would like to emphasize (Table 6.14). **The process of environmental programming as a spatial process needs its spatial elements to influence the institutional programming of its ideal social structure**.

6.4.1.5. Correlation of the Responses between the Concept of 'Relations' and 'Dimensions'

In the concept of 'role', (a) **there is not a singular relation between 'an activity' and 'a rule'**, as is sometimes suggested or implied by appeal to statements like 'the rule governing the Queen's move' in chess. Activities or practices are brought into being in the context of overlapping and connected sets of rules, given coherence by their involvement in the constitution of socio-spatial systems in the movement of time. Also (b) **rules cannot be**

exhaustively described or analysed in terms of their own content, as prescriptions, prohibitions, etc.: precisely because, **apart from those circumstances where a relevant lexicon exists**, ***rules and practices only exist in conjunction with one another***.

The role concept has been subject to a variety of critiques. For Parsons, as Giddens (1979) explains, social systems consist in interconnected roles; and role "is the primary point of direct articulation between the personality of the individual and the structure of the social system". Giddens mentions three major types of objection against the use of the notion of role in social analysis. First although the notion of role is often introduced in the literature as allowing some 'free play' for the social actor, that is, avoiding the reduction of human behaviour to the determinism of social causes, for the most part role theory heavily emphasizes the 'given' character of roles. **It is the individual's performance' in the role which he or she might have some influence or mastery over, not the role itself**.

Role analysis hence often tends to perpetuate the action/structure dualism in social theory: society supplies the roles to which actors adapt as best they might. Such an emphasis tends to persist even among some of those writers who allot a considerable conceptual space to human agency. According to Goffman (1969), for example: "In entering the position, the incumbent finds that he must take on the whole array of action encompassed by the corresponding role, so role implies a social determinism and a doctrine about socialisation.... Role then is the basic unit of socialisation. It is through roles that tasks in society are allocated and arrangements made to enforce their performance."

Second, the idea of role is often used in such a way as to presume both a unity of normative expectations that cohere to form the role, and a consensus in a social system about what those expectations are. The former of these assumptions tends to be encouraged by the conception that **for each position in a social system, there is a corresponding role, or 'role set'**. It betrays a particular, and deficient, view of society according to which stability and the 'ordered regulation of expectations' are natural, and to which change is foreign. The linkage of role to normative consensus, which is a particularly central feature of Parson's sociology, has been debated by those role theorists who wish to distance themselves from the consensual

character of the Parsonian portrayal of society. But the conflicts or strains which are acknowledged by such authors predominantly tend to concern the relation between the individual actor and the role expectations that 'society' calls upon him or her to meet. **'Role strain' derives from disjunctions between an individual's psychological traits and role demands**.

Third, the conception that role in the basic constituent element of social systems is a major prop to the Parsonian view of the overriding importance of values or norms on social analysis. **Role is a normative concept**; **hence to claim that social systems consist of roles can readily be used to affirm the primacy of the normative in social theory**.

While Giddens dose not reject the notion of role altogether, he certainly rejects the idea that social systems can usefully be understood as consisting of roles or their conjunction; and the associated thesis that role, to requote Parsons, "the primary point of direct articulation between the personality of the individual and the structure of the social system". For Giddens "**it is fundamental to affirm that *social systems are not constituted of roles but of (reproduced) practices*; and it is practices, not roles, which** (via the duality of structure) **have to be regarded as the 'points of articulation' between actors and structures**".

Hence this is the whole point of these practices that they go through the structure of the thought of the society and develop it according to its ideal programming. There is no difficulty therefore in thinking of socio-spatial systems as structured 'fields' in which (as reproduced in the temporality of interaction) **elements/actors occupy definite positions vis-a-vis one another**. Thus **role-prescriptions have to be studied in their interrelation with the actual practices that are the 'stuff' of social life; there may be various kinds of dislocation between what is enjoined in role-prescriptions and what actors typically do as the occupants of particular social positions**. It is important however to bear in mind what has been said previously in respect of rules: no socio-spatial practice expresses, or can be explicated in terms of, a single rule or type of resource. Rather, practices are situated within intersecting sets of rules and resources that ultimately express features of the totality.

Hence, in talking about cities, also, we need not only to talk about objects, but about systems of purposeful spatial roles. Those dimensions of the cities that are not immediately co-present with the observer at the time that he or she formulates his or her comment about them. It suggests that space is bound up even more deeply with the ways in which social formations acquire and change their very form. **The most far-reaching changes in the spatial form have usually either involved or led to profound shifts in social changes, and in the relation of spatial milieu to its society. These shifts appear to be not so much a by-product of the spatial changes, but an intrinsic part of them** (Hillier et al., 1984).

The growth of the modern interventionist state in the city of Meshed has also been associated with social changes. The ideal of this kind change, to quote Hillier et al. (1984), would seem to be "a sparse landscape of free-standing buildings, or groups of buildings, arranged into relatively bounded and segregated regions, internally subdivided and hierarchically arranged, and linked together by a specialised and separate system of spaces for movement. The relationship of such a landscape to its predecessors can only be conjectural, since in its physical form it is virtually the opposite of the previous system in which densely and contiguously aggregated buildings defined, by virtue of their positioning alone, a more or less deformed grid of streets that unified the system into a uniformly accessible whole". It is clear that the first outcome of this kind transformation of space is not environmental improvement but an environmental pathology of a totally new and unexpected kind which generates social problems. The manifest existence of this pathology would seem to be the assumption that space could only be important to society by virtue of being identified with a particular benetits, preferably instrumental ones.

In the correlation D[1] (Table 6.15), the researcher gathers all the responses with the concept of relations: when referring to *social subjects* there are two kinds, 'social structural principles' and 'social instrumental principles'; when referring to *objects* there are also two kinds, 'philosophic structural principles' and 'state instrumental principles'; and finally when referring to *elements* there are also two kinds, 'symbolic structural principles' and 'symbolic instrumental principles' (Figure 6.7).

[Individuals] + [Deep Ideal Programming] = [Social Structural Principles] *such as Social Relations*
[Individuals] +[Surface Instrumental Programming] = [Social Instrumental Principles] *such as Especialized Relations*

[Information] +[Deep Ideal Programming]=[Philosophic Structural Principles] *such as Islamic Rules*
[Information] +[Surface Instrumental Programming] = [State Instrumental Principles] *such as State Rules*

[Elements] +[Deep Ideal Programming] = [Symbolic Structural Principles] *such as Spirituality*
[Elements] +[Surface Instrumental Programming] = [Symbolic Instrumental Principles] *such as Accessibility*

Figure (6.7) Programmed Relations (Source: The Author)

Correlation D[1] represents all the responses with the consept of relations. They are less 'social relations' (20%) than 'socio-spatial relations' (29%) and 'spatial relations (51%). In the 'social' column, 82% of the responses are related to 'social structural principles', 3% to 'social instrumental principles', 3% to 'philosophic structural principles' and the remaining 12% to 'state instrumental principles'. Respondents have clearly put the 'social structural principles' in the middle point of their answers (Table 6.15). The next column, i.e. 'socio-spatial relations', is all about 'symbolic instrumental principles' (100%). And the next column, i.e. 'spatial relations', is about both 'symbolic structural principles' (43%) and 'symbolic instrumental principles' (57%). Although people are *more* looking for the 'structural principles' than the other principles in the 'socio-spatial relations', they have *more* in mind the 'instrumental principles' (57%) than the 'structural principles' (43%) in 'spatial relations'.

Again the researcher arranges all the positive/negative responses with the concept of 'relations' in the correlation D[2] (Tables 6.16 and 6.17). In the 'social' dimension 48% of the responses are mentioned in positive meanings with refer only to 'social structural' characteristics. And 52% of the responses are mentioned in negative meanings with refer to different characteristics: 66% to 'social structural'; 6% to 'social instrumental'; 6% to 'philosophic structural'; and finally 22% to 'state instrumental'.

Therefore, people have *several times* mentioned the 'social structural principles' in positive meanings (100%), but they have also mentioned them in negative meanings (66%). **It indicates people are unhappy with those relations**. Again, even though there are a limited number of 'social instrumental principles' (6%) and even 'philosophic structural principles'

(6%), they have all repeated in negative meanings. 'State instrumental principles' have also repeated in negative meanings, emphasizing their negative roles in every day's urban practice.

D[1]. Responses with the Concept of Relations

Social Relations		Socio-spatial Relations		Spatial Relations	
Social relations *(Social structural principle)*	45			Facilities *(symbolic instrumental principle)*	26
				Accessibility *(Symbolic instrumental principle)*	24
		Intellectuality *(symbolic structural principle)*	21	Beauty & harmony *(symbolic structural principle)*	20
		Sacrosanctity (holiness) *(symbolic structural principle)*	20	Transport *(symbolic instrumentalprinciple)*	19
		Purity & spirituality *(symbolic structural principle)*	18	Grace & unique *(symbolic structural principle)*	13
				Organization *(symbolic structural principle)*	12
		Aboundance *(symbolic structural principle)*	11	Greatness & preciousness *(symbolic structural principle)*	8
State rules *(state instrumental principle)*	7	Educativity *(symbolic structural principle)*	7	Greenery *(symbolic instrumental principle)*	6
				Air circulation *(symbolic instrumental principle)*	5
Family relations *(social structural principle)*	4	Prosperity & flourishment *(symbolic structural principle)*	4	Sight vision of Harem *(symbolic structural principle)*	4
				Urban walk *(symbolic instrumental principle)*	4
		Blessing *(symbolic structural principle)*	3	Management *(symbolic structural principle)*	3
Islamic relations & rules *(Philisophic structural principle)*	2	Disruption & derangment *(symbolic structural principle)*	2	Safety *(symbolic structural principle)*	2
				Suitibility *(symbolic structural principle)*	2
				Complexity *(symbolic instrumental principle)*	2
Neibourhood relations *(social structural principle)*	1			Spatial relations *(symbolic structural principle)*	1
Seperated jobs *(social instrumental principle)*	1			Utility *(symbolic structural principle)*	1
Specialized duties *(social instrumental principle)*	1				
Total	20%		29%		51%

Table (6.15) The Number of Responses with the Concept of Programmed Functional Relations

Social Relations:	**20%**
Social Structural Principles	82%
Social Instrumental principles	3%
Philosophic Structural Principles	3%
State Instrumental Principles	12%
Socio-spatial Relations:	**29%**
Symbolic Structural Principles	100%
Spatial Relations:	**51%**
Symbolic Structural Principles	43%
Symbolic Instrumental Principles	57%

D[2]. Positive & Negative Responses with the Concept of Relations

	Positive Meaning		Negative Meaning	
Social	Faithful social relations (45) Social relations *(social structural principle)*	22 2	Lost faithful social relations Lack of social relations *(social structural principle)*	16 5
			State rules (7) *(state instrumental principle)*	7
	Family relations (4) *(social structural principle)*	4		
			Lack of Islamic relations & rules (2) *(philosophic structural principle)*	2
	Neibourhood relations (1) *(social structural principle)*	1		
			Seperated jobs (1) *(Social instrumental principle)*	1
			Specialized duties (1) *(social instrumental principle)*	1
Socio-spatial	Intellectuality (21) *(symbolic structural principle)*	12	Lack of intellectuality *(symbolic structural principle)*	9
	Sacrosanctity (Holiness) (20) *(symbolic structural principle)*	11	Withdrawal of holiness of place *(symbolic structural principle)*	9
	Purity & spirituality (18) *(symbolic structural principle)*	10	Lack of purity & spirtuality Lost purity & spirituality *(symbolic structural principle)*	2 6
	Aboundance *(symbolic structural principle)*	2	Lost aboundance (11) *(symbolic structural principle)*	9
			Lack of educativity (7) Lost educativity *(symbolic structural principle)*	6 1
	Prosperity & flourishment (4) *(symbolic structural principle)*	4		
	Blessing (3) *(symbolic structural principle)*	3		
			Disruption & derangment (2) *(symbolic structural principle)*	2

Table (6.16) The Number of Positive & Negative Responses with the Concept of Programmed Functional Relations

D[2]. Positive & Negative Responses with the Concept of Relations (continued)

	Positive Meaning		Negative Meaning	
Spatial	Facilities *(symbolic instrumental principle)*	3	Lack of facilities (26) *(symbolic instrumental principle)*	23
			Lack of accesibility (24) Lost accessibility *(symbolic instrumental principle)*	17 7
	Beauty & harmony *(symbolic structural principle)*	9	Lost beauty & Harmony (20) Lack of beauty & harmony *(symbolic structural principle)*	6 5
			Lack of transport (19) Incompetent transport *(symbolic instrumental principle)*	17 2
	Grace & unique (13) *(symbolic structural principle)*	13	Lost organization (12) *(symbolic structural principle)*	12
	Greatness & preciousness (8) *(symbolic structural principle)*	6	Lost greatness of place *(symbolic structural principle)*	2
			Lack of greenery (6) *(symbolic instrumental principle)*	6
	Air circulation (5) *(symbolic instrumental principle)*	5	Lack of urban walk (4) *(symbolic instrumental principle)*	4
	Sight vision of Harem (4) *(symbolic structural principle)*	4	Lost management (3) Lack of management *(symbolic structural principle)*	2 1
			Lack of safety (2) *(symbolic structural principle)*	2
			Complexity (2) *(symbolic instrumental principle)*	2
			Lack of suitibality (2) *(sumbolic structural principle)*	2
	Utility (1) *(symbolic structural principle)*	1	Lost spatial relations (1) *(symbolic structural principle)*	1
Total		37%		63%

Table (6.17) The Number of Positive & Negative Responses with the Concept of Programmed Functional Relations (continued)

Social Relations:	**20%**	
Positive Meanings	48%	100% Sosial Structural Principles
Negative Meanings	52%	66% Social Structural Principles 6% Social Instrumental Principles 6% Philosiphic Structural Principles 22% State Instrumental Principles
Socio-spatial Relations:	**29%**	
Positive Meanings	49%	100% Symbolic Structural Principles
Negative Meanings	51%	100% Symbolic Structural Principes
Spatial Relations:	**51%**	
Positive Meanings	27%	80% Symbolic Structural Principles 20% Symbolic Instrumental Principles
Negative Meanings	73%	30% Symbolic Structural Principles 70% Symbolic Instrumental Principles

The next dimension, i.e. 'socio-spatial relations', consists of 49% of the responses with positive meanings and 51% with negative meanings. They are all about 'symbolic structural principles' emphasizing those relations that people feel in space in their every day social life.

And, again the next dimension, i.e. 'spatial relations', represents 27% of the responses with positive meanings and the remaining 73% with negative meanings. Looking at the results with the concept of spatial relations tell us how 'instrumental principles' with negative meanings (70% out of 73% negative ones) are *more* emphesized by people than 'structural principles' with positive meanings (80% out of 27% positive ones) (Table 6.17). **It means that the process of environmental programming as a spatial process also needs its spatial relations to influence the institutional programming of its ideal social structure**.

6.4.1.6. Comparison between Responses with the Concepts of 'Elements/Actors' and 'Relations'

At this stage, Table (6.18) reminds us the differences between two concepts of 'elements/actors' and 'relations': when the first is a *substance,* the second is *a form* or *an idea*; when the first is *a transmissible information,* the second is *a transmissible instruction;* or when the first *steps outside the constraints,* the second *puts elements and actors in a proper place.* It means while 'the structural hierarchy' with the possibility of different statements, *itself does nothing to its surroundings,* 'the functional hierarchy' with the ability of being stable against environmental influences, is *active in changing its surroundings.*

Since the unit of social systems is not the individual human but the 'role' that part of the person which is concerned with the organisation, this defines that all social life is a programmed activity with shifting relations in space and time. Thus the formative idea of programme imposes variable constraint on the purpose of individuals. Hence, the emergence of artificial order in thought depends on the generation of: (1) social structure, i.e. the self-ideal process of puprsuing purposeful social relations; and (2) symbolic structure, i.e. the self-conscious process of transmitting meaningful information. This represents the time-dependent programming of socio-spatial practices resulting from purposeful social relations.

By referring to Figures (6.6) and (6.7) Table (6.18) represents the results of two concepts of 'elements/actors' and 'relations' (bottom of the Table). It shows in what extend the results are similar or different. The main theme in 'social elements/actors' is the repeated numbers of '*institutional subjects*' (47%) against '*the strategic objects*' (13%), and in 'social relations'

again the repeated numbers of '*social structural principles*' (82%) against '*state instrumental principles*' (12%). Responses emphasize on the important role of the '*institutional subjects*' (47%) beside the role of the '*social structural principles*' (82%), and also the role of the '*strategic objects*' (13%) beside the role of the '*state instrumental principles*' (12%).

As a summary, therefore, the main theme in 'social elements/actors' is the repeated numbers of '*subjects*' (47% +22%) against '*objects*' (13%), and in 'social relations' again the repeated numbers of '*social principles*' (82%+3%) against '*philosophic and state principles*' (3%+12%). **Responses emphasize on the role of the '*subjects*' besides the role of the '*social principles*', with the same value**; and also **the role of the '*objects*' besides the role of the '*philosophic and state principles*', again with the same value**. Hence, **the whole point is the important role of the 'people' against 'information' and the important role of the 'relations between people' against 'relations between information'**.

By referring to responses with positive and negative meanings in both concepts, numbers indicate that '*institutional subjects*' and '*social structural principles*' cover the main part of the positive meanings of their group. **It means people do enjoy in having faithful social relations in their face-to-face social interaction**. But, **numbers also indicate that whereas *people* need more information about '*social structural principles*'** (66% lack of faithful social relations) **the available information is *more* about '*state instrumental principles*' than '*philosophic structural ones*'**. Also, they indicate that **experts use more instrumental principles than ordinary people, criticizing what kind of information is for people and what kind for experts**.

Again, there are 25% repeated '*lack of people's presence*' besides 66% '*unfaithful social relations*'. **It indicates there are *more* problems with changed social relations than lack of people's presence**. **People do participate in every day social interactions, but they have changed their attitudes about social ideals**. Also again, in spite of the fact that there are only 3% '*lack of information*' in the column of the 'elements/actors', its beside, in the column of the 'relations', there are 22% negative meanings in '*state instrumental principles*' against 6% lack of '*philosophic structural principles*' (6%) (Table 6.18). It means there is no

serious problem with the 'lack of information', but, instead there is problem with the 'lack of competent relations between information' - **changed principles**. The next dimension, i.e. 'socio-spatial relations', is also talking about 100% '*symbolic structural principles*', 49% with positive meanings and the remaining 51% with negative meanings. It means there is a problem of lack of competent socio-spatial relations in the city centre of Meshed. In spite of the fact that **people feel a sense of spirituality and intellectuality and even blessing in the Harem, they have also a sense of loosing those senses in their every social life in the city centre**.

Programmed Elements/Actors		**Programmed Relations**	
'Substance' 'Transmissible Information' 'Stepping outside the Constraints' 'Symbolic' 'Possibility of Different Statements' 'Itself Does Nothing to its Surroundings'		'Form' 'Idea' 'Transmissible Programme' 'Putting Elements and Actors in a Proper Place' 'Stable' 'Homeorhesis against Environmental Influences' 'Active in Changing its Surroundings'	
Social:	**(39%)**	**Social:**	**(20%)**
Institutional Subjects (e.g. People)	47%	Social Structural (e.g. Social Relations)	82%
Non- Institutional Subjects (e.g. Experts)	22%	Social Instrumental (e.g. Especialized Relations)	3%
Strategic & Non-Strategic Objects (e.g. Information)	13%	Philosophic Structural (e.g. Islamic Rules)	3%
Symbolic & Instrumental Mediates (e.g. Money & Goods)	18%	State Instrumental (e.g. State Rules)	12%
Positive Meanings:	54%	Positive Meanings:	48%
(66% Institutional Subjects)		(100% Social Structural)	
(22% Strategic & Non-Strategic Objects)			
(12% Symbolic & Instrumental Mediates)			
Negative Meanings:	46%	Negative Meanings:	52%
(25% Institutional Subjects)		(66% Social Structural)	
(47% Non-Institutional Subjects)		(6% Social Instrumental)	
(3% Strategic & Non-Strategic Objects)		(6% Philosophic Structural)	
(25% Symbolic & Instrumental Mediates)		(22% State Instrumental)	
Socio-Spatial:	**(0%)**	**Socio-Spatial:**	**(29%)**
		Symbolic Structural (e.g. Spirituality)	100%
		Positive Meanings:	49%
		(100% Symbolic Structural)	
		Negative Meanings:	51%
		(100% Symbolic Structural)	
Spatial:	**(61%)**	**Spatail:**	**(51%)**
Elements:	100%	Relations:	
Symbolic (e.g. Traditional Buildings)		Symbolic Structural (e.g. Beauty)	43%
Instrumental (e.g. Modern Buildings)		Positive Meanings: 50%	
Positive Meanings:	82%	Negative Meanings: 50%	
(92% Located in the Centre)		Symbolic Instrumental (e.g. Accessibility)	57%
Negative Meanings:	18%	Positive Meanings: 10%	
(100% Located in the Centre)		Negative Meanings: 90%	

Table (6.18) The Comparison between Responses with the Concept of Programmed Elements/Actors and the Concept of Programmed Relations

In fact, the most fundamental properties of cities are their ordering of space into programmed systems with shifting relations in space and time for embodying social purposes. They are wholes in which good parts arise, rather than assemblages of parts into a whole. This is because of the fact that the production of urban meaning arises purposively, which operates at two levels: the *parts* and the relations between parts, the *whole*. And this relates to the fundamentally recursive character of socio-spatial life, and expresses the mutual dependence of structure and agency; that the structural properties of socio-spatial systems are both the medium and the outcome of the practices that constitute those systems. But in our case, **the main purpose of the belt, the fast access to the centre focusing on its centrality, is a confusion between two principles of spatial patterning**: ***instrumental*** **and** ***structural***, or **between the** ***order of centrality*** **and** ***the emergence of structural order from centre***. **According to the structural programming of this city, priority is not the fast access to the centre but the symbolic hierarchy of its spatial order to the centre**.

Whatever nowadays exists in the city centre of Meshed is not the structural programming of the city but a mass of elements without real relationships; not a transformation of the previous time but something strange coming from other place. Structural transformation takes place when centralization takes place, and this involves both elements and relations. In fact only structural programmes define how the elements are related to each other and also to the function, and if we cut one of them, the autonomous structure will die. In Meshed, therefore, **the centre is going to be gradually the centre of place rather than the centre of space**. **It involves only 'locations' and 'positions' rather than 'relations'**.

Hence by referring to responses in 'spatial' dimension (Table 6.18), there are 82% repeated 'spatial elements' related to positive meanings and only 18% to negative meanings. **This means that there is no serious problem with spatial elements**. But, when looking at 'spatial relations', 43% of responses have 'structural' characteristics with 50% positive meanings and 50% negative meanings, whereas in contrast 57% of responses have 'instrumental' characteristics with only 10% positive meanings and 90% negative meanings. Results show that **there is a lack of 'competent structural principles' in spatial patterning of socio-spatial systems**; and **even though 'instrumental principles' have been used to structure**

the environment in the way of achieving maximum instrumental interest of it, because of the lack of the symbolic structural principles of social programming, they are not actually doing well in patterning the structure of socio-spatial systems.

6.4.1.7. Correlation of the Responses between the Concept of 'Structural Functions' and 'Dimensions'

In developing the account of agency and structure, the conception of structuration introduces temporality as integral to socio-spatial theory; and that such a conception involves breaking with the synchrony/diachrony or static/dynamic divisions. The general tendency has been to identify time with the diachronic or dynamic; synchronic analysis represents a 'timeless snapshot' of society. **The result is that time is identified with socio-spatial change.**

The identification of time and change has the assimilation of 'timeless' and socio-spatial stability: that static analysis allows us to determine the sources of stability, while dynamic analysis is needed to understand the sources of change in socio-spatial systems. Since we are ignorant of the past of many small-scale, isolated societies, we cannot study them dynamically, we cannot specify the changes they have gone through. But we can, by studying them in the present, disclose what holds them together; we can indicate the sources of their stability by showing the factors which lend them their cohesion.

Giddens (1979) notes that such an equation of the static and the stable is untenable. It is demonstrated by two ways. First, on the practical level, there simply is no way in which a 'static' analysis can actually be carried out: the study of socio-spatial activity involves the elapse of time, just as that activity itself does. In the face of this, Levi-Strauss has developed his own version of 'reversible time'. Thus it is recommended as a research principle that the researcher should not spend less than a year studying a society, since thereby it is possible to gain material upon the whole of the annual cycle of social life. However if time is acknowledged on the level of the practical exigencies of research, through being viewed as 'reversible time', it remains foreign to the theoretical scheme in terms of which that research is organised and explicated. Second, even on the level of theory the assimilation of the static

and the stable incorporates an element of time. To speak of socio spatial stability *cannot* involve abstracting from time, since 'stability' means continuity over time. A stable socio-spatial order is one in which there is a close similarity between how things are now and how they used to be in the past. As Gellner (1964) says: "How can one say, as some anthropologists seemed to say almost with one breath, that the past of a tribal society is unknown, *and* that is known to be stable?

Levi-Strauss is surely justified in emphasizing the importance of the emergence of historicity, and the various conceptions of history associated with it, in the modern world; and to contrast this with the 'reversible time' of traditional cultures. But 'reversible time' is a misnomer (Barnes, 1971). It is not really time as such that Levi-Strauss is referring to, but social change (Giddens, 1979). Here, then, **we see an equation of time with social change**. **Time elapses is a sequential way in all societies, but in those in which tradition is pre-eminent, processes of socio-spatial reproduction are interwoven with different forms of awareness of past, present and future than in the contemporary industrialised world**: a kind of programmed coherent functions carried by dynamic controls.

Tradition is the 'purest' and most innocent mode of socio-spatial reproduction: tradition, in its most elemental guise, may be thought of, as one writer puts it, "as an indefinite series of repetitions of an action, which on each occasion is performed in the assumption that it has been performed before; its performance is authorised - though the nature of the authorization may vary widely - by the knowledge, or the assumption of previous performance" (Pocock, 1972). The sloughing-off of tradition in a certain sense begins with its understanding *as* tradition: **tradition has its greatest sway when it is understood simply as how things were, are (and should be) done**. The encapsulation of certain practices as 'tradition', however, undermines tradition by placing it alongside other modes of legitimating established practices. The advent of literacy, especially mass literacy, is a major influence modifying tradition. When literacy is confined to a small elite, it is not necessarily directly corrosive of tradition, since its monopoly by the few can be used to sanction doctrines held to be inherent in 'scriptures'. But we may agree with the author quoted above in his claim that "... **a literate tradition is never a pure tradition, since the authority of written words in not**

dependent on usage and presumption only. As durable material objects they cut across processes of transmission and create *new patterns* of social time; they speak *directly* to remote generation..." (Pocock, 1972, p. 255).

When tradition is not 'pure social reproduction', when it is no longer dependent on 'usage and presumption only', the way is cleared for the intrusion of 'interpretation'. Thus, as Giddens (1979) notes, although writing and the text have become the preoccupations of some of the more abstract forms of structuralism, the emergence of writing actually tends to be connected, in a profound sense, to hermeneutics and to historiography; each of these is associated with the rise of a concern for problems of ideology, in both intellectual disciplines and in practical political activity. He says: "'Hermeneutical concerns' in the sense of the confrontation on conflicting interpretations of written materials, have emerged in all the major world religions. But **tradition does not remain at the level of the interpretation of the past, but is questioned the very principle of tradition itself, the authority which the past exercises over the present**" (p. 201).

It is not too fanciful to suppose that the development of writing underlies the first emergence of the 'linear time consciousness' which later became the basic of historicity as a feature of social life. Writing permits the contact with 'remote generations' mentioned above, but in addition its very linearity as a material form perhaps encourages the consciousness of the elapsing of time as a sequential process, leading 'from' one point 'away' to another point in a progressive manner. It is probably reasonable to say that, as with tradition, 'time' is not distinguished as a separate dimension' in traditional cultures in terms of time consciousness itself: "... **the temporality of social life is expressed in the meshing of present with past that tradition promotes, in which the cyclical character of social activity is predominant**" (Ibid.). Consciousness of history as a progression of change, rather than as the constant re-enactment of tradition, and the availability of 'exemplars' located differntially in time or space for current procrsses of transformation, basically alter the overall conditions of socio-spatial reproduction in the contemporary societies. As Carr says (1969), "... one reason why history so rarely repeats itself is the dramatic personae at the second performane have prior knowledge of the *denouement*."

In the correlation E[1] (Table 6.19) the researcher gathers all the responses with the concept of structural functions: when referring to *individuals* they are two kinds: 'socail structural functions' and 'socail instrumental functions'; and when referring to *elements* they are also two kinds: 'symbolic structural functions' and 'symbolic instrumental functions' (Figure 6.8).

[Individuals] + [Social Structural Principles] = [Social Structural Functions]
such as Traditional Life
[Individuals] + [Social Instrumental Principles] = [Social Instrumental Functions]
such as Modern Life

[Elements] + [Symbolic Structural Principles] = [Symbolic Structural Functions]
such as Traditional Urbanization
[Elements] + [Symbolic Instrumental Principles] = [Symbolic Instrumental Functions]
such as Modern Urbanization

Figure (6.8) Programmed Functions (Source: The Author)

Correlation E[1] represents all the responses with the concept of structural functions. In the 'social' column 96% of the responses are related to 'social structural functions', whereas only 4% are related to 'social instrumental functions'. Respondents have clearly put the 'social structural functions' in the middle point of their answers (Table 6.19). The next column, i.e. 'socio-spatial functions', is less about 'structural functions' (27%) and more about 'instrumental functions' (73%). But the next column, i.e. 'spatial functions', has nearly similar results: 55% 'structural functions' and 45% 'instrumental functions'. **Although people are looking for 'structural functions' *more* than the 'instrumental ones' in the social column, they have in mind *more* 'instrumental functions' than the 'structural ones' in both socio-spatial and spatial columns**.

Again the researcher arranges all the positive/negative responses with the concept of 'structural functions' in correlation E[2] (Tables 6.20 and 6.21). In the 'social' dimension 70% of the responses are mentioned in positive meanings all referring to 'structural' characteristics, and 30% are mentioned in negative meanings referring to different characteristics: 81% 'structural'; and 19% 'instrumental'. Therefore, people have *several times* mentioned the 'structural functions' in positive meanings (100%), but they have also mentioned them in negative meanings (81%). **It indicates they have problems with *social* structural functions.**

E[1]. Responses with the Concept of Structural Functions

Social Controls		Socio-spatial Controls		Spatial Controls	
Traditional rituals *(structural function)*	29			Urban control *(structural function)*	27
Islamic rituals *(structural function)*	26			Urban progress *(structural function)*	21
Islamic mouring rituals *(structural function)*	19				
Traditional life *(structural function)*	16				
Islamic festive rituals *(structural function)*	14			Urban expansion *(instrumental function)*	13
		Huge businesses *(instrumental function)*	11	Expansion of Harem (structural function)	8
New year's day festivals *(structural function)*	7			Urban development *(structural function)*	6
		Traditional urban life *(structural function)*	6	Renovation of urban textures *(structural function)*	6
				Regression & withdrawal & retreat & omission of traditional textures *(instrumental function)*	6
				Losing spaces *(instrumental function)*	6
Intimate social life *(structural function)*	4	Immigration *(instrumental function)*	4	Destruction of Islamic & national monuments *(instrumental function)*	4
Traditional life beside modern life *(instrumental function)*	3			Destruction of traditional textures *(instrumental function)*	3
				Expansion of open spaces *(instrumental function)*	3
				Seperation of pedestrians and motors *(instrumental function)*	3
				Circumambulation (going round) the Harem by car *(instrumental function)*	3
				Usage of space in different levels with different values *(instrumental function)*	3
Public life *(structural function)*	2			Destruction of houses *(instrumental function)*	2
National rituals *(structural function)*	2			Withdrawal of greatness of place *(instrumental function)*	2
				Withdrawal of parade of the Harem courtyards *(instrumental function)*	2
				Direction of close spaces to open spaces *(instrumental function)*	2
Modern life *(instrumental function)*	1	Modern & mechanized urban life *(instrumental function)*	1	Direction of roads to the centre *(structural function)*	1
National festivals *(structural function)*	1			Long way open spaces without especial use *(instrumental function)*	1
Heterogeneous social life *(instrumental function)*	1			Access to other roads by going round the Harem *(instrumental function)*	1
				Respect & improvment of religiuos values of place *(structural function)*	1
				Modern &mechanized urbanization *(instrumental function)*	1
				Isolation of Harem *(instrumental function)*	1
				Destruction of traditional bazaars *(instrumental function)*	1
Total	45%		10%		45%

Table (6.19) The Number of Responses with the Concept of Programmed Functions Carried by Dynamic Controls

Social Functions:	**45%**
Structural Function	96%
Instrumental Function	4%
Socio-spatial Functions:	**10%**
Structural Function	27%
Instrumental Function	73%
Spatial Functions:	**45%**
Structural Function	55%
Instrumental Function	45%

The next dimension, i.e. 'socio-spatial functions', 27% refers to positive meanings - all about structural functions - and the rest (73%) to negative meanings - all about instrumental functions. These are all about those functions in spatial sense that people do in their every day social life in the city. Again the next correlation, represents all the responses with the concept of 'spatial functions', 17% with positive meanings and the remaining 83% with negative meanings. Looking at the responses with spatial concept tell us how 'instrumental functions' with negative meanings (49% out of 83% negative ones) are *more* emphesized by the people than 'structural functions' with positive meanings (73% out of 17% positive ones) (Table 22). The results show again how people are unhappy in these two functions either.

E[2]. Positive & Negative Responses with the Concept of Structural Functions

	Positive Meaning		Negative Meaning	
Social	Traditional rituals (29) *(structural function)*	12	Lost (leaving) traditional rituals Lack of traditional rituals *(structural function)*	13 4
	Islamic rituals (knowing & preserving) (26) *(structural function)*	19	Lack of Islamic rituals *(structural function)*	7
	Islamic mouring rituals (19) *(structural function)*	19		
	Traditional life (16) *(structural function)*	10	Lost traditional life *(structural function)*	6
	Islamic festive rituals (14) *(structural function)*	14		
	New year's day festivals (7) *(structural function)*	7		
	Intimate social life (4) *(structural function)*	4	Modern life beside traditional life (3) *(instrumental function)*	3
	Public life (2) *(structural function)*	2	Lack of national rituals (2) *(instrumental function)*	2
	National festivals (1) *(structural function)*	1	Modern life (1) *(instrumental function)*	1
			Heterogeneous social life (1) *(instrumental function)*	1
Socio-spatial	Traditional urban life (6) *(structural function)*	6	Huge businesses (11) *(instrumental function)*	11
			Immigration (4) *(instrumental function)*	4
			Modern & mechanized urban life (1) *(instrumental function)*	1

Table (6.20) The Number of Positive & Negative Responses with the Concept of Programmed Coherent Functions Carried by Dynamic Controls

E[2]. Positive & Negative Responses with the Concept of Structural Functions (continued)

	Positive Meaning		Negative Meaning	
Spatial			Lack of urban control (27) *(structural function)*	27
			Lack of urban progress (21) *(structural function)*	21
			Urban expansion (13) *(instrumental function)*	13
	Expansion of Harem (8) *(structural function)*	8		
			Lack of urban development (6)	4
			Incompetent urban development *(structural function)*	2
	Renovation of urban textures (6) *(structural function)*	6		
			Regression & withdrawal & retreat & omission of traditional textures (6) *(instrumental function)*	6
			Losing spaces (6) *(instrumental function)*	6
			Destruction of Islamic & national monuments (4) *(instrumental function)*	4
	Seperation of pedestrians and motors (3) *(instrumental function)*	3	Destruction of traditional textures round the Harem (3) *(instrumental function)*	3
	Usage of space in different levels with different values (3) *(instrumental function)*	3		
			Expansion of open spaces round the Harem (3) *(instrumental function)*	3
			Circumambulation (going round) the Harem by car (3) *(instrumental function)*	3
			Withdrawal of greatness of place (2) *(instrumental function)*	2
			Withdrawal of parade of Harem courtyards (2) *(instrumental function)*	2
			Destruction of houses (2) *(instrumental function)*	2
			Direction of close spaces to open spaces (2) *(instrumental function)*	2
	Respect & improvment of religiuos values of place (1) *(structural function)*	1	Isolation of the Harem (1) *(instrumental function)*	1
	Direction of roads to the centre (1) *(structural function)*	1	Long way open spaces withoutespecial use (1) *(instrumental function)*	1
			Access to other roads by going round the Harem (1) *(instrumental function)*	1
			Modern & mechanized urbanization (1) *(instrumental function)*	1
			Destruction of traditional bazaars (1) *(instrumental function)*	1
Total		42%		58%

Table (6.21) The Number of Positive & Negative Responses with the Concept of Programmed Coherent Functions Carried by Dynamic Controls (continued)

Social Functions:	**45%**		
Positive Meanings	70%	100%	Structural Function
Negative Meanings	30%	81%	Structural Function
		19%	Instrumental Function

Socio-spatial Functions:	**10%**		
Positive Meanings	27%	100%	Structural Function
Negative Meanings	73%	100%	Instrumental Function
Spatial Functions:	**45%**		
Positive Meanings	17%	73%	Structural Function
		27%	Instrumental Function
Negative Meanings	83%	51%	Structural Function
		49%	Instrumental Function

6.4.1.8. Correlation of the Responses between the Concept of 'Structuration' and 'Dimensions'

The researcher believes that the unhappiness observation achieved in the previous concept comes from conditions governing the continuity or transformation of structures, either social or socio-spatial and spatial. In fact, in the replacement of the synchrony/diachrony opposition with a conception of structuration, the possibility of change is recognised as inherent in every circumstance of socio-spatial reproduction. The concept of structuration involves that of the *duality of structure, which relates to the fundamentally recursive character of socio-spatial life, and expresses the mutual dependence of structure and agency*. It thus, rejects any differentiation of synchrony and diachrony or statics and dynamics. The identification of structure with constraint is also rejected: **structure is both enabling and constraining**, and **it is one of the specific tasks of socio-spatial theory to study the conditions in the organisation of socio-spatial systems that govern the interconnection between the two**.

According to this conception, as Giddens (1979) explains, the same structural characteristics participate in the subject (the actor) as the object (society): "Structure forms 'personality' and 'society' simultaneously - but in neither case exhaustively: because of the significance of unintended consequences of action, and because of unacknowledged conditions of action. We may agree in the sense that every process of action is a production of something new, a fresh act; but at the same time all action exists in continuity with the past, which supplies the means of its initiation. Structure thus is not to be conceptualised as a barrier to action, but as essentially involved in its production: even in the most radical processes of social change which, like any others, occur in time" (p. 70).

According to the notion of the duality of structure, rules and resources are drawn upon by

actors and elements in the production of interaction, but are thereby also reconstituted through such interaction. Structure is thus the mode in which the relation between moment and totality expresses itself in socio-spatial reproduction. That is to say, the differences which constitute socio-spatial systems reflect a dialectic of presences and absences in space and time. But these are only brought into being and reproduced via the virtual order of differences of structures, expressed in the duality of structure. The differences that constitute structures, and are constituted structurally, relate 'part' to 'whole' in the sense in which the utterance of a grammatical sentence presupposes the absent corpus of syntactical rules that constitute the language as a totality. The importance of this relation of moment and totality for socio-spatial theory cannot be exaggerated, since it involves a dialectic of presence and absence which ties the most minor or trivial forms of socio-spatial action to structural properties of the overall society.

In this stage, the correlation F[1] (Table 6.22) represents all the responses with the consept of structuration. All columns have similar value of repeated responses (34%, 36% and 30%). **Although people are looking *more* for 'social' conditions in the social column, they have *also* in mind 'socio-spatial' and 'spatial' conditions in the other columns**.

Again the researcher arranges all the positive/negative responses with the concept of 'structuration' in correlation F[2] (Tables 6.23 and 6.24). In the 'social' dimension 16% of the responses are mentioned in positive meanings and 84% in negative meanings. People have *several times* mentioned the social conditions with negative meanings. It indicates that **they have serious problems in the conditions governing the continuity and transformation of the social structure, and therefore the reproduction of social systems**.

F[1]. Responses with the Concept of Structuration

Social Structuration		Socio-spatial Structuration		Spatial Structuration	
		Feeling peace	55	Traditional textures	36
Intellectual transformation	24	Feeling satisfaction & happiness	24		
Faith & purity	15	Feeling convenience	17	Traditional bazaars	15
				Commercial centre	15
Time limitation	12	Feeling responsibility	12	City centre	12
People's views	11			Harem surroundings textures	11
				Ruined textures	9
People's participation	7				
Islamic behaviours	6				
Islamic attitudes	6				
Love & friendship	6				
Preoccupation	6				
Contentment (necessity rather than desire)	6				
Benevolence & mercy/ expectation	5	Feeling comfort	5	Pilgrims centre	5
Forgiveness/vengeance	4				
Impatience & nervous (tiredness & losing interest)	4				
Competition	4				
Organic participatory	3	Feeling familiarity	3	Urban textures	3
People's huge potency	3	Real observation	3	Shopping centre	3
Confidence & trust	3	Real perception	3		
		Feeling wondering	3		
Individual influences	2	Feeling free	2	New textures	2
Settlement & permanency	2	Feeling near oneself	2	Tourist centre	2
		Feeling recognition	2	Adminstration centre	2
		Feeling attachment	2	Highrise buildings beside traditional textures	2
		Heavenly remuneration	2		
		Understanding of city centre	2		
Constant consensus	1	Feeling ownership	1		
Integrated people	1	Feeling belonging	1	Economic centre	1
		Feeling hast	1	Geometric centre	1
				Province centre	1
Total	34%		36%		30%

Table (6.22) The Number of Responses with the Concept of Open-ended Hierarchical Autonomous Organized Levels of Authority of Elements/Actors

Social Structuration:
Social Condition of Action 34%

Socio-spatial Structuration:
Socio-spatial Condition of Action 36%

Spatial Structuration:
Spatial Condition of Action 30%

F[(2]. Positive & Negative Responses with the Concept of Structuration

	Positive Meaning		Negative Meaning	
Social	Intellectual transformation (24)	6	Lost intellectual transformation Lack of intellectual transformation	16 2
	Faith & purity	4	Lack of faith & purity (15) Retreat of faith	6 5
			Time limitation (12)	12
			Lack of people's views (11) Lost people's views	10 1
			Lost people participation (7) Lack of people participation	5 2
	Islamic behaviours	2	Lost Islamic behaviours (6)	4
	Islamic attitudes	2	Lost Islamic attitudes (6)	4
			Preoccupation (6)	6
			Lost love & friendship (6) Lack of love & friendship	4 2
	Contentment (necessity rather than desire)	2	Lost contentment (desire rather than necessity) (6)	4
	Benevolence & mercy	2	Lost benevolence (expectation) (5) Lack of benevolence	2 1
	Forgiveness	2	Lost forgiveness (vengeance) (4)	2
			Impatience & nervous (tiredness & losing interest) (4)	4
			Competition (4)	4
			Lost organic participatory (3) lack of organic participatory	2 1
			Lost people's huge potency (3)	3
			Lack of honesty (3)	3
			Lack of confidence & trust (3) Lost confidenc & trust	2 1
	Settlement & permanency (2)	2	Individual influences (2)	2
			Lost constant consensus (1)	1
			Lost integrate people (1)	1

Table (6.23) The Number of Positive & Negative Responses with the Concept of Open-ended Hierarchical Autonomous Organized Levels of Authority of Elements/Actors

F[2]. Positive & Negative Responses with the Concept of Structuration (continued)

	Positive Meaning		Negative Meaning	
Socio-spatial	Feeling peace (55)	30	Lack of feeling peace	13
			Lost peace	12
	Feeling satisfaction & happiness	9	Lack of satisfaction & happiness (24)	8
			Lost satisfaction & happiness	7
	Feeling convenience	4	Lack of convenience (17)	11
			Lost convenience	2
			Lack of responsibility (12)	12
	Feeling comfort (5)	5	Feeling wondering (3)	3
	Feeling familiarity (3)	3		
	Real observation (3)	3		
	Real perception (3)	3	Understanding of city centre (2)	2
	Feeling free (2)	2		
	Feeling near oneself (2)	2		
	Feeling recognition (2)	2		
	Feeling attachment (2)	2		
	Heavenly remuneration (2)	2	Feeling hast (1)	1
	Feeling ownership (1)	1		
	Feeling belonging (1)	1		
Spatial	Traditional textures	9	Lost traditional textures (36)	19
			Lack of traditional textures	8
	Traditional bazaars (15)	7	Lack of traditional bazaars	8
	Comercial centre (15)	15		
	City centre (12)	12	Lost Harem surroundings textures (11)	11
			Ruined textures (9)	9
	Pilgrims centre (5)	5	Unpleasant urban textures (3)	3
	Shopping centre (3)	3	Highrise buildings beside traditional textures (2)	2
	New textures (2)	2		
	Tourist centre (2)	2		
	Adminstration centre (2)	2		
	Economic centre (1)	1		
	Geometric centre (1)	1		
	Province centre (1)	1		
Total		38%		62%

Table (6.24) The Number of Positive & Negative Responses with the Concept of Open-ended Hierarchical Autonomous Organized Levels of Authority of Elements/Actors (continued)

Social Structuration:	**34%**
Positive Meanings	16%
Negative Meanings	84%

Socio-spatial Structuration:	**36%**
Positive Meanings	49%
Negative Meanings	51%
Spatial Structuration:	**30%**
Positive Meanings	50%
Negative Meanings	50%

By referring to the next dimension (Tables 6.23 and 6.24), i.e. 'socio-spatial structuration', there are 49% of the responses with positive meanings, and 51% with negative meanings. These are all about those conditions in spatial sense that people feel in their every day social life in the city. Again the next dimension, represents all the responses with the concept of 'spatial structuration', 50% with positive meanings and 50% with negative meanings. Looking at the responses with 'socio-spatial' and 'spatial' dimensions tell us that in what extend those conditions have affected social conditions. **It not only means that people have a sense of dissatisfaction** (50%) **about spatial milieu of their city, but it also indicates that they feel the most social interactions occur in their city centre**. All those places repeated in the spatial dimension and even most of the traditional textures are located in the city centre. If people feel 84% out of 34% negative conditions in social dimension, they have also responded 51% out of 36% negative socio-spatial conditions and 50% out of 30% negative spatial conditions in following dimensions. Responses in spatial dimension refer to city centre either directly or indirectly.

Of course centre has a potential to transfer the structure over time, but transformation takes place when centralization takes place. The advantage of expanding and contracting of individuals' socio-spatial practices is to see the actors both in a whole individually and as a whole with each other. It seems it is not enough only to order an order of centrality - the ring road round the Holy Harem - instead of the mechanism of centralizing the subject's thought.

6.4.1.9. Correlation of the Responses between the Concept of 'Systems' and 'Dimensions'

These all encourage the researcher to examine the reproduced relations between actors or collectivities and spatial elements, organised as regular socio-spatial practices. In fact, the basic domain of the study, according to the theory of structuration, is neither the experience

of the individual actor, nor the existence of any form of socio-spatial totality, but socio-spatial practices ordered across space and time. Human socio-spatial activities, like some self-reproducing items in nature, are recursive. That is to say, they are not brought into being by social actors but continually recreated by them via the very means whereby they express themselves *as* actors. In and through their activities agents reproduce the conditions that make these activities possible. However, the sort of 'knowledgeability' displayed in nature, in the form of coded programmes, is distant from the cognitive skills displayed by human agents. It is in the conceptualizing of human knowledgeability and its involvement in action.

It is the specifically reflexive form of the knowledgeability of human agents that is most deeply involved in the recursive ordering of socio-spatial practices. Continuity of practices presumes reflexivity, but reflexivity in turn is possible only because of the continuity of practices that makes them distinctively 'the same' across space and time. 'Reflexivity' hence should be understood not merely as 'self-consciousness' but as the monitored character of the ongoing flow of socio-spatial life. The concept of socio-spatial system, therefore, understood in its broadest sense, refers to reproduced *interdependence of action*: in other words, to "a relationship in which changes on one or more component parts initiate changes in other component parts, and these changes, in turn, produce changes in the parts in which the original changes occurred" (Etzioni, 1968). The most relevant sources of connection between biological and social theory do not involve the functional analogies, but rather concern recursive or *self-reproducing* systems.

Therefore, the notion of integration, as Giddens employs, refer to the degree of interdependence of action, or 'systemness', that is involved in any mode of system reproduction. 'Integration' can be defined as regularised ties, interchanges or *reciprocity of practices* between either actors or collectivities. 'Reciprocity of practices' has to be understood as involving regularised relations of relative *autonomy* and *dependence* between the parties concerned. It is important to emphasize that *integration is not synonymous with 'cohesion', and certainly not with 'consensus'*. But it is extremely important to emphasize that the systemness of 'social integration' - as concerned with systemness on the level of *face-to-face interaction* - in contrast of 'system integration' - as concerned with systemness on the

level of *relations between social systems or collectivities* - is fundamental to the systemness of society as a whole. System integration cannot be adequately conceptualised via the modalities of social integration; none the less the latter is always the chief prop of the former, *via the reproduction of institutions on the duality of structure*. The duality of structure relates the smallest item of day-to-day behaviour to attributes of far more inclusive social systems. In fact the unintended consequences of action stretch beyond the recursive effects of the duality of structure: this introduces the further series of influences, to those that the differentiations in Figure (6.9) refer.

SYSTEM	=	interdependence of action
	conceived as	(1) homeostatic causal loops
		(2) self-regulation through feed-back
		(3) reflexive self-regulation

Figure (6.9) Different Kinds of Interdependence of Action (Source: Giddens, 1979)

As critics influenced by systems theory have pointed out, homeostasis is only one form or level of such interdependence: and one, borrowing from a physiological or mechanical model, where the forces involved operate most 'blindly'. It is not the same as self-regulation through feed-back, and is a more 'primitive' process. It seems evident enough that homeostatic causal processes are an important feature of the reproduction of social systems. Homeostatic features of social systems may be distinguished from those which belong to a higher order, involving self-regulation through feed-back via the operation of selective 'information filtering'. Feed-back mechanisms may promote stasis: but, unlike homeostatic processes, they can also be directional, propelling controlled change. Because they are just *purposive* (see Chapter 4 Section B on the process and the control). A fairly direct parallel can be drawn between such feed-back effects and processes involved in social systems. **But, reflexive self-regulation process is a distinctively human phenomenon, with many important implications. Since it is *purposeful*, it controls its dynamic through an internal record which has some aspect of self-observation**. In other words, **it involves with progressive individualization resulting from progressive centralization that certain actors gain a dominant role and so determining the behaviour of the whole social integration. Within this respect, it is**

also the important fact of the space that all social life is a programmed activity with shifting relations in space and time. That its function is a process in time, in which the appearance of time-dependent function is the essential characteristic of its hierarchical organization in space. It is the relationships between what purposeful elements do and the pursuit of their common purpose in spatial occasions - the ideal - that gives 'unity' and 'identity' to their social integration. Hence, **the formative idea of the programme imposes *variable* constraints on the purpose of the individuals to confine the space in the movement of time**.

Correlation G[1] represents all the responses with the consept of 'system'. Actually the columns do not have similar value of numbers (21%, 35% and 44%), and spatial systems heve been mentioned more than the others. **Although people are looking *more* for 'social' conditions mentioned in previous correlation** - conditions governing the continuity or transformation of the social structure, **they have in mind *more problems* in 'socio-spatial' and 'spatial' reproduced relations in the correlation of 'systems'** - reproduced relations organised as regular practices.

Also the researcher arranges all the positive/negative responses with the concept of 'systems' in the correlation G[2] (Tables 6.26 and 6.27). In the 'social' dimension 11% of the responses are mentioned in positive meanings and 89% in negative meanings. People have *several times* mentioned the 'reproduced organized relations of social systems' in negative meanings. **It indicates people have problems in the reproduction of social integrations**.

G[1]. Responses with the Concept of System

Social Interactions		Socio-spatial Interactions		Spatial Interactions	
Respecting rules & duties	26	Shopping	35	Traffic	55
Health	16	Pilgrimaging	23	Crowd	25
Supporting & maintaing urban environment	11	Walking for pleasure (recreating)	12	Chaos	24
Cooperating with urban executors	10	Worshipping	11	Order	24
Cooperating with people associations	8	Visiting people	11	Pollution	18
Dedicating vows & endowments	8	Recalling past memories	10	Waste of time	11
Sustaining &taking care of urban facilities	5	Working	10	Quikness of affairs	11
Prodigality (want instead of need)	5	Doing official businesses	9	Waste of money	8
Cooperating with urban experts	4	Sightseeing	6	Neatness	7
Crime	3	Bivovacing	6	Cool	5
Protecting ancient & artistic & historic works	1	Visiting friend & relatives	4	Fresh weather	3
Comparing old & new values	1	Refreshing	4	Accumulation	3
		Learning	3	Oldness & wearness	2
		Taking part in traditional rituals	3	Different levels	2
		Parking	2	Noise	1
		Trading	2	Far distances	1
		Different activities	2		
		Labouring in building mosques & urban facilities	2		
		Meeting at mosques	1		
		Paying dedications	1		
		Welcoming foreign guests	1		
Total	21%		35%		44%

Table (6.25) The Number of Responses with the Concept of Programmed Functional Time-dependent Systematic Interaction of Elements/Actors

Social Systems: Reproduced Social Interactions	21%
Socio-spatial Systems: Reproduced Socio-spatial Interactions	35%
Spatial Systems: Reproduced Spatial Interactions	44%

By referring to the dimension of 'socio-spatial systems', there are 90% of the responses with positive meanings, and 10% with negative meanings. These are all about those activities that people have in their every day social life in the city. Again, the next dimension represents all the responses with the concept of 'spatial systems', 17% with positive meanings and 83% with negative meanings. Looking at the numbers, indicate that even though people have 90% positive sense that they need socio-spatial systemness, but they feel only 17% positive sense about spatial systemness of their city. **It not only means that people have a sense of dissatisfaction about spatial systemness of their city, but also indicates that they feel all those problems are happenning in their city centre**. Those places mentioned by people and also most of the traditional textures repeated by them are located in the city centre. These are all related to the lack of competent social systems which in 'social' dimension there are 89% of the responses with negative meanings. Responses such as *lack of respecting rules and duties* and *lack of supporting urban environment* and even *lack of taking care of urban facilities* all come from the lack of competent social conditions in previous correlation as discussed before.

G[2]. Positive & Negative Responses with the Concept of System

	Positive Meaning		Negative Meaning	
Social			Lack of respecing laws & duties (26)	21
			Lost respecting laws & duties	5
	Lost lack of health	4	Lack of health (16)	12
			Lost supporting & maintaining urban environment (11)	8
			Lack of supporting & maintaining urban environment	3
			Lack of cooperating with urban executors (10)	10
	Cooperating with people associations	2	Lack of cooperating with people associations (8)	6
			Lost dedicating vows & endowments(8)	8
			Lack of sustaining & taking care of urban facilities (5)	4
			Lost sustaining & taking care of urban facilities	1
			Prodigality (want instead of need) (5)	5
			Lack of cooperating with urban experts (4)	4
	Lost crime (3)	3		
	Protecting ancient & artistic & historic works (1)	1		
	Comparing old & new values (1)	1		

Table (6.26) The Number of Positive & Negative Responses with the Concept of Programmed Functional Time-dependent Systematic Interactions of Elements/Actors

G[2]. Positive & Negative Responses with the Concept of System (continued)

	Positive Meaning		Negative Meaning	
Socio-spatial	Shopping (35)	35		
	Pilgrimaging (23)	23		
	Walking for pleasure (Recreating) (12)	12		
	Worshipping (11)	11		
	Visiting people (11)	11		
	Recalling past memories (10)	8	Lost recalling past memories	2
	Working (10)	10		
	Doing official businesses (9)	9		
	Sightseeing (6)	4	Lost sightseeing	2
			Bivovacing (6)	6
	Visiting friend & relatives (4)	4		
	Refreshing (4)	4		
	Learning (3)	3		
	Taking part in traditional rituals (3)	3		
			Lost labouring in building mosques & urban facilities (2)	2
	Trading (2)	2	Parking (2)	2
	Different activities (2)	2	Lost meeting at mosques (1)	1
	Paying dedications (1)	1	Welcoming foreign guests (1)	1
Spatial	Easy traffic	13	Traffic (55)	32
	Quick traffic	8		
	Vehicle traffic	2		
	Lost crowd	2	Crowd (23)	21
			Chaos (24)	24
			Lost order (24)	5
			Lack of order	19
			Pollution (18)	18
			Waste of time (11)	11
	Quikness of affairs (11)	6	Lack of quikness of affairs	5
			Waste of money (8)	8
	Neatness	3	Lost neatness (7)	2
			Lack of neatness	2
			Lost cool (hot sunshine in the summer and freezinf in the winter) (5)	5
			Lost fresh weather (3)	3
			Accumulation (3)	3
			Oldness & Wearness (2)	2
			Different levels (2)	2
			Far distances (1)	1
			Noise (1)	1
Total		41%		59%

Table (6.27) The Number of Positive & Negative Responses with the Concept of Programmed Functional Time-dependent Systematic Interactions of Elements/Actors (continued)

Social Systems:	**21%**
Positive Meanings	11%
Negative Meanings	89%
Socio-spatial Systems:	**35%**
Positive Meanings	90%
Negative Meanings	10%
Spatial Systems:	**44%**
Positive Meanings	17%
Negative Meanings	83%

6.4.1.10. Comparison between Responses with the Concepts of 'Structuration' and 'Systems'

Then, in our final analysis, Table (6.29) shows the differences between two concepts of 'structuration' and 'programmed systems'. It indicates; when the first is *conditions governing the continuity or transformation of structure* the second is *reproduced relations organised as regular practices*; when the first is *structuring of structure* the second *is actual functioning of relations*; or when the first is *structuring of relations across space and time* the second is *reproduced organized systems over the course of time*; and so on. Thus when in the 'structuration' there is *an open-ended hierarchical autonomous organized levels of authority of elements/actors*, in the 'programmed systems' there is *a time-dependent functional systematic interaction of elements/actors.*

Actually, inappropriate spaces and their incompatible usages cause improper social ambitious on developing and evaluating the structure of socio-spatial systems. The main issue is that people face problems in structuring the structure of those systems, and this comes from unstructured changes which occur in their environment. The main role of city centre is that it is itself the main conditions governing the continuity or transformation of the structure of the thought of the society in all dimensions. This role comes from keeping both elements and relations which in our case only elements have been left and relations have been changed. **This change causes gradual changes on socio-spatial structure of the city which in turn has some effects on the ideal structure of its society**. When every thing comes from out of the genuine structure, it will be no structural transformation and no progressive achievement, except chaos and confusion - sometimes visible and sometimes invisible.

Structuration		Programmed Systems	
'Conditions Governing the Continuity or Transformation of Structure' 'Structuring of Structure' 'Structuring of Relations across Space and Time, in the Virtue of the Structure as the Medium and Outcome of the Conduct it Recursively Organizes' 'Open-ended Hierarchical Autonomous Organized Levels of Authority of Elements/Actors'		'Reproduced Relations Organised as Regular Practices' 'Actual Functioning of Relations' 'Reproduced Organized Systems over the Course of Time' 'Programmed Time-dependent Functional Systematic Interaction of Elements/Actors'	
Social: (e.g. People Participation, Confidence, Intellectual Transformation)	**(34%)**	**Social:** (e.g. Respecting Rules & Duties)	**(21%)**
Positive Meanings: Negative Meanings:	16% 84%	Positive Meanings: Negative Meanings:	11% 89%
Socio-spatial: (e.g. Feeling Peace, Responsibility, Belonging)	**(36%)**	**Socio-spatial:** (e.g. Shopping, Sightseeing, Visiting Friends)	**(35%)**
Positive Meanings: Negative Meanings:	49% 51%	Positive Meanings: Negative Meanings:	90% 10%
Spatial: (e.g. Urban Textures, City Centre)	(30%)	**Spatail:** (e.g. Traffic, Chaos, Crowd)	**(44%)**
Positive Meanings: Negative Meanings:	50% 50%	Positive Meanings: Negative Meanings:	17% 83%

Table (6.28) The Comparison between Responses with the Concept of Structuration and the Concept of Programmed Systems

By referring to responses with those concepts (bottom of the Table 6.29), the numbers show in what extend the results are related to each other. In social dimension, both positive and negative, the results are nearly the same. It means that if conditions governing the continuity or transformation of social structure across space and time is 84% negative, besides the reproduced relations of social actors over time is also 89% negative. But in socio-spatial and spatial dimensions, the results are different. Although people 51% suffer from the conditions governing the continuity of socio-spatial structures, nevertheless in the next concept there are only 10% negative responses in socio-spatial systems. But, if there are only 50% negative meanings in conditions governing the continuity of spatial structures, in the next concept there are 83% negative responses in spatial systems. It means, **although people have unacceptable sense about spatial spaces, still use them or need them and although they like their city centre and also traditional textures, nevertheles they suffer from uncomfortable life which is offered by their spatial systemness. This affects those social relations which again cause spatial influences.**

SUMMARY *and* CONCLUSIONS

Thought Process of the Study
The Summary of the Study

- The Case
- The Background of the Study
- Overview of the Study

The Core Idea of the Study
The Questionnaire
Final Words

Thought Process of the Study

The 'complexity' that is manifested in human life and the built environment requires us to develop either *philosophic views* to sense the complexity itself or *theoretical tools/concepts* to reveal the nature of complex entities. This concern led the author to explore the essentials behind forming an understanding of the built environment and manipulating it into a programme of action. The 'sources of concern' were threefold - *discussions as recorded in literature*, *problems made evident through the case study of the city centre of Meshed* and *the author's own personal experience and reflection*. These cannot be seen as separable for they all support and relate to one another. The study began with a general overview of literature which led to the philosophy of science and established an understanding of processes of thought and action and how these enable living social systems to interact with their environment. Through the reflections of the author, in consideration of the problems apparent in the case study, the most comprehensive such concept proved to be 'centrality', which in itself embraced many other concepts such as 'hierarchy', 'symmetry', 'contrast' and 'rhythm'.

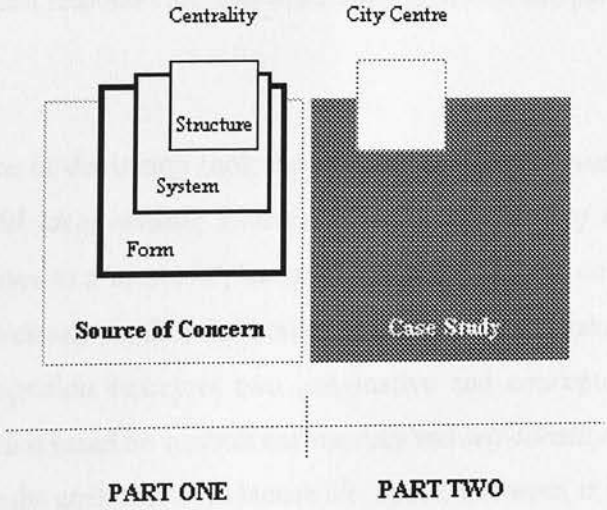


Figure (c.1) The Thought Process of the Study. The diagram illustrates the focus of the study which is based on two approaches: one tends to construct the concept of centrality out of relavant sources of concern, using inductive inference; the other reveals conceptual solutions for the problems of the city centre of Meshed, using again induction inference by employing the concept of centrality as a criterion.

The concept of centrality appears throughout nature and is initially apparent through the 'forms' that living and non-living entities take. Further study reveals that they operate within 'systems' which also conform to this conceptual tool. Moreover, the manners in which living systems exist, transform and develop in time - their 'structures' - are dependent on centralised organisation (see Figure c.1). There is a strong interrelation of all these three levels of being but these correlations do not register directly and non-hierarchically from every element but are referred through their centres. This purifies each level into a completely unity - the centre - without which such interrelation of all components would not be possible.

An investigation of principles through the philosophy of science clarified the benefits of *ideal seeking systems* which contrasts with *biological, pre-programmed and random systems*. An 'ideal seeking system' is just an epistemological tool, and a way of translating idea into activity. In its observation of nature and natural philosophies, the study realises that life systems exist in a centralised method. It goes on to investigate *centrality*, a tool of thought whose scope and flexibility enables it to absorb and synthesise information in an environment of *complexity*. The thesis formulates, by induction, a purification of the idea of centrality into a means to test and develop intelligent responses and one which is applicable to the particular problems of the built environment.

A logical sequence of discussion took the study from the processes of *living organisms*, through *purposeful ideal seeking systems* and the *processes of thought* directly to an understanding of space as a 'symbolic', 'concrete' phenomenon that contains all events within an actual fabric that closely parallels the thought process. The most valuable principle revealed is that space recognition embraces two imaginative and conceptual phenomena - *self-consciousness* which is based on symbols and memory and *self-ideality* which processes these understandings into the goals that drive human life. Space, however, is different from all other symbolic systems - semantics, social conduct etc. which only occupy the level of self-consciousness and depend on people's immediate reflexive recognition - in being concrete, not a passive by-product of human existence by an active participant in our lives. Space is more than a function of human thought but participates in the highest level on our behaviour and development. This brought to a conclusion Part One of the thesis, with the assertion of an

epistemological tool that the author could use to interpret the data gathered in the 'case study' and which could be synthesised into research that could be implemented in future to forestall the problems that initiated this study.

The necessity of building up a concept of centrality arose from difficulties highlighted in the city centre of Meshed. The author felt that grand developments carried out in the 'case study' had a negative effect on the concept of the city centre as a special religious and social space. She also felt that urban matters as taught in the University of Teheran did not enable students to respond to, remedy and prevent in the future such errors. In order to back up these worries with supportive and empirical research, the author formulated a questionnaire and used this to measure people's personal evaluations of the city centre in Part Two. The diverse responses were analysed using the concept of centrality which, in Part One, was induced as a typical tool by which people understood and interpreted their world. The bulk of the text developed the means of recognising and dealing with problems, a means which the raw data of case study filtered and usefully interpreted through.

The value of these responses were that they expressed intellectual and philosophical concerns about the purpose of the urban core by means of simple considerations and through more mundane criticisms. These specific issues reflected shared human values and ideals which belong to an unfolding pattern of centrality through which it is possible to relate popularly expressed dissatisfactions - for example the inability to create social links within certain settings - to a comprehensive paradigm. This established a powerful case for insisting on a code of urban design that is compatible with the concept of centrality.

Summary of the Study

- **The Case**

The construction of the ring road round the Holy Shrine in the centre of the Iranian city of Meshed, and the gradual appearance of stylistic buildings such as hotels and shopping centres - imported from international context - would seem to provide evidence of the liberation of the instrumental form of the built environment. With the transition to an environment in which instrumental relations pre-dominate and which are released from their stylistic forms we could

fully expect to see profound changes within the social process and within the organization of space.

However many of the changes are superficial and others simply fragmentize the qualities that exist under the *traditional* built environment. For people, there is little difference between the inadequacies of the structured layout programme of the *old* built environment, such as *high density* and *small spatial scale*, and the appearance of the incoherent highly-instrumental design of the *new* built environment, such as *superficial imposition* and *planned fragmentation*, that are equally beyond the well-ordering and well-functioning of the city centre. In the case of the city of Meshed, nowadays there is a ring road round the centre which is called order in terms of *instrumental* order rather than *structural* order. In this situation, therefore, the city has become a place for unstructured social changes or a place for non-organized and damaged social relations. This has been either examined by the outcomes of the new concept of centrality within the study or expressed by the outcomes of the construction of peoples' attitudes to current urban changes within the survey.

- **The Background of the Study**

The main purpose of the study is to define that the changes in the social production of space is always linked to the changes in the character of social relations, and that the examination of the unstructured transformation of the city centre of Meshed provides us with a key to unlocking the mysteries of the space. It is to define the ways in which we could possibly change the inadequacies which exist in a highly-structured layout programme of *a complex structured built environment*, especially the one which exists in city centres.

Since any description of complexity must be limited, we are able to reveal it only by using symbols which cut directly through all the layers and windings of our consciousness. This defines the process of formulating theoretical concepts which in understanding *complexity* is the only device that man has at his disposal to help him deal with the highly complex world. This is the important role of these concepts that the study is looking for the concept of *centrality* following some concern to the nature of *complexity* in city centres. It is either via the process of formulating the theoretical concept of centrality (i.e. the inductive process of

building centrality) or via the process of interpreting the theoretical concept of centrality (i.e. the deductive process of applying centrality).

The study is an attempt to bring together some of the proposed ideas about the concept of centrality in the built environment. Many have been originally put forward accompanied by a *decoration of complexity of urban forms*, and some have been due to the difficulty of finding ways of formulating *the structure of the complexity of urban systems*. The study proposes its idea of centrality more profoundly in searching *the structure of the complexity of urban systems in the process of change over time*. It defines the level of the complexity which involves *the reorganisational process of order*: that the structural centre of this kind is the origin of the system itself, reserving the main data information which is necessary for the process of change over time.

The task of the study is so to *formulate* the concept of centrality by comparing 'descriptive', 'explanatory' and 'simulative' approaches, mostly in terms of the 'structural' *interpretation* of the process in 'living complex social systems'. Within this comparison the study proposes that in the process of interfere of different properties concerning open systems, the regular repetition of these properties alters with the lapse of time. So the main point to emphasize is the origin of this regularity not the regularity itself - the process. It looks for the *mechanism* within *deep structures*. This refers to the 'function-modelling' or the 'simulative' approach of the principle of centrality which is carried out to establish the differences between different mechanisms of various levels of concern from *surface appearance of structure* to *deep symbolic structure*. The approach is looking for an analysis which seeks for the artificial entity through which the relation between man and environment is mediated - the symbolic structure. That is to find out how spatial centrality *functions* in terms of both *action* and *change*: as an integrated entity of *man* and *environment*; and as an integrated entity of *knowledge* and *experience*. It looks for the principle of *subjectivity* in social science which holds that behaviour has to be studied and described in terms of the actor's orientation towards the situation. It is concerned with the differences between *biological systems* and *purposeful ideal-seeking systems* that the comparison between these two characterises the method of this study to formulate the concept of centrality in the structure of the complexity of city centres.

• Overview of the Study

In *descriptive* approach, the study highlights the symbolic genesis of the centre in various urban patterns. First, it determines the way we describe the nature of different appearances of natural patterns to characterise *the role of centre and circle in nature*, and the way societies order *the symbol of the symmetric centre* in their urban patterns. Second, it characterises why central expression of urban patterns is derived from its *evolutionary* character. It is to highlight *the creative power of the centre* that the symbolic order of the centre has the capacity to manifest other symbolic orders within itself. It examines how centre is the place which maintains the permanency and continuity of symbols; how it relates to the whole experience of life which repeats, recalls and recollects the Ideas or Archetypes. Finally, it characterises the ideal idea of the centre when these two - *the container centre* and *the centric contained* are united. It is to emphasize how centre as a symbol could possibly contain other symbols. In this respect, the purpose of the centre is not only to hold the other symbols but also to involve them in the whole experience of life. It is indeed the only way to attain the creative power of the centre that every symbol which is contained in the symbolic centre is also involved in the centre of life itself.

In *explanatory* approach the study attempts to give a synthetic summaries of the conclusions which proceeds to the simulative approach of the concept of centrality in *the complexity of process* in *the structure of urban centres*. It actually associates with two kinds of questions: first, to define what structure urban centres have; and second, what function they really operate. According to the first question, the study finds itself unconvinced by the underlying assumption that there are unchanging or relatively unchanging patterns built in the structure of complex urban centres which express themselves in any conditions of time and space. This puts the student of *centre genesis* (i.e. *structural genesis of the centre*) at a disadvantage compared with, for example, the geologist and geomorphologist who adopt the principle of uniformitarianism. But, the benefits of this concept is obtained by adopting a little more generality, and asserting that the human method of confronting reality has always been the same in that the brain is basically a comparing machine which provides spatial orientation towards the centre.

Therefore, concerning *centre evolution* (i.e. *structural hierarchy in the centre*) - still relating to the first question - the central area of any city has an important *time* dimension. It is an account containing *evolution* to pay careful attention to progression through time. Here, the major focus is while urban systems as a whole obey the Second Law of Thermodynamics their centres manifest an evolution towards organization and negentropy[1]. Here the study puts an emphasis on the most important missing point about city centres that in searching and analysing the genesis of structural hierarchy as an organizational order for cities, neither the view of the '*centre as a closed system*' nor the view of the '*centre as an open system dependents upon either transport links with its tributary area or extra territorial links to other organizing centres*' are the important focuses of the subject of centrality. Instead, the view that the '*centre as an open system is part of its living society and not some autonomous by-product of it*' becomes the most important focal attribute of it. This suggests that a 'centre' is in itself an open system: not only linked with its tributary area and other organizing centres in a systematic order of *non-living systems* such as 'static', 'dynamic' and 'homeostatic' but also most importantly linked with its living society in a systematic order of *living systems* such as 'self-maintaining', 'self-awareness', 'self-consciousness' and 'self-ideality'.

These values of orders which could be found in different levels of system complexes such as self-reproduction', 'teleology', 'meaning' and 'desire' introduce the category of open systems not only limited to *the pre-programmed process* of 'living organisms' but also most importantly to *the open-ended purposeful process* of 'social systems' which in our cases, cities and centres, are the main focus of the subject of centrality. In this kind the structural hierarchy would be looking for the genuine structure of the symbols either *abstract* or *concrete* which leads a complex urban system as it alters with the lapse of time. It leads all *the changes to generate the diachronous sequences of the system over time*. And, this suggests the search for functional hierarchy in an urban inquiry which defines the differences between all these levels and structures.

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[1] This is similar to von Bertalanffy's alteration in 'General Systems Theory' who expressed while closed systems obey the Second Law of Thermodynamics and proceed towards increasing entropy, open 'organismic' systems can import negentropy via their extra-system links, and this causes them to tend towards an increasing inner order (Source: Von Bertalanffy, L., 1971, *General System Theory - Foundations development Applications*).

It defines actually that in searching for centrality in the structure of an urban system, it is not only in the plane of *the surface structure* (i.e. *the hierarchy of the framework of function* or *the functional hierarchy of urban system in a synchronous plane*) that the 'hierarchy of function' should be questioned. Instead, it is also in the plane of the *deep structure* or *transformational rules* (i.e. *the hierarchy of function over time* or *the functional hierarchy of urban system in diachronous sequences*) that the 'hierarchy of function' should be inquired. The study looks for the structure of a *process* in which the system alters with the lapse of time - a living process. The focus is to define how the process of a living urban centre operates as time passes and how it is related to the concept of centrality.

It is to introduce the basic problem of living systems which arises in the relation between *'structure'* and *'function'*, or the same, the relation between *'potential generative capacity'* and the *'realization of that potential'*. It is to emphasize that in living systems, the organization involves separating the function of *'storing information'* from that of actually *'using the information as instructions'* in the movement of time. In other words, it is to define that in a living system function is a process in time: an appearance of time-dependent function which characterises its hierarchical organization; a *functional hierarchy* which realizes its *structural hierarchy*; or **a progressive individualization which results from its progressive centralization**.

However, the study proposes that if in the emergence of the order in living organisms there are: first, *genetic structured information in space-time dimension*; and second, *time-dependent functional instruction in three dimensional synchronous space*, in the emergence of artificial order in thought the process is reverse. In the process of thought there are: first, *generation of time-dependent functional instruction* of self-ideal/purposeful process of social programming *in three dimensional synchronous space*; and second, *generation of symbolic structured information* of self-conscious/self-reflexive process of social programming - for transferring more useful information - *in space-time dimension* which both together create the structure of thought of the society. Societies are free in creating this structure which it is itself open ended. The contrast here is between ontogenetically fixed genetic hypotheses and free, non-terminating mental hypothesis construction.

The Core Idea of the Study

The major concern of this outcome - i.e. the progressive individualization resulting from progressive centralization - is to open up the debate about the nature of the *transformation* of the abstract structure of thought (i.e. symbolic structure) over time which it is itself open-ended and not pre-programmed. Since 'function' is the subject of the study of *concrete* social practices, the outcome suggests the inquiry of *the process of space over time* within which the major focus of this research proposes that human societies build their spatial environment in order to construct a spatial structure. It is about ordered relation of parts to a whole, but not only (1) with the organization in which the elements are linked together as it is in non-living systems, but also (2) with the mode in which the relation between moment and totality expresses itself in *reproduction* as it is in living systems.

The proposal idea defines that the study of a built form needs to be aware of two facts. First, **the constitution of socio-spatial meaning operates at two levels**: **the level of concrete** (the process of practice), **and the level of abstract** (the process of inducing). **It introduces the creative process of pursuing social purposes in *three dimensional synchronous space* and the directive process of inducing social ideals in *space-time dimension***. In other words, **it is not only a creative process *constrained by past achievements* but also a directive process *traced by perfect ideals***. Secondly, **it indicates that this constitution also operates at another two levels**: **the level of self-ideality'** (the level of system of socio-spatial practice) **and the level of self-consciousness** (the level of system of urban appearance). Consequently, **the main point to emphasize is that its function has two kinds of processes**: **'purposeful' and 'self-reflexive'**. **'Purposeful' process is concerned with self-ideal principles of social reorganization in terms of how a built form is confined**: **its function is a necessary part of social programming**. In contrast, **'self-reflexive process' is concerned with self-conscious formulation and evaluation of choices of symbolic spatial principles in terms of which features of presence a built form might 'let through'**: **it is the function of the principles of social reorganization**.

Therefore, the principal issue with which the author is concerned is that of connecting the notion of human action with structural explanation in socio-spatial analysis. The making of

such a connection, an adequate account of human agency must situate action in space and time as an self-ideal and self-conscious continuous flow of conduct. It defines that the access to the past that is opened up, for instance, by the material existence of texts is however a distanciated interaction, if we contrast it to the presence of others in face-to-face interaction. It does not open up the opportunity to conduct the actual experience of continuity of reflexive monitoring of action. Hence, it neither has the ability to incorporate the sum of the products of past generations in a continuous flow of every day practice nor the ability to develop the structure of the past achievements *over time*. It is an emphasis on the *co-ordination of movement in space and time*, as the coupling of a multiplicity of paths or trajectories. The same conception can be applied to much broader issues of social change: change in society can also be understood in terms of space-time paths. Social development characteristically involves spatial as well as temporal movement. **The study proposes that only *'structural'* principles of socio-spatial programming by using the systematic orders of 'self-ideality' and 'self-consciousness' could lead the ways that spatial elements are related to each other and to the function**.

The advantage of expanding and contracting the individuals' experiences in space is thus to see them both in a whole individually and as a whole with each other. They lead *'symbolic'* and *'instrumental'* principles of spatial patterning parallel to each other. **The study proposes that this emerges from the centre itself**. The *'instrumental'* principles of spatial patterning, the function of every day production and reorganization, are checked and developed through the *'symbolic'* principles of spatial patterning, the function of social reproduction and social programming over time. **Therefore, it is not just physical presence in immediate interaction which matters in city centres**: ***it is the temporal and spatial availability of others in it***. **This is related to the open-ended generation of spatial symbolic structure of the thought of the society within which structuration process takes place only with respect to the ultimate ideal and ultimate desire of the social programming**.

The main purpose of the belt in the city centre of Meshed, the fast access to the centre focusing on its centrality, is a confusion between two principles of spatial patterning: *'instrumental'* and *'symbolic'*, or between *the order of centrality* and *the emergence of order*

from centre. Its instrumental design keeps all the 'elements' of the *symbolic structure of the city* but ignores all the 'assumptions' of its *ideal programming*. Therefore, whatever exists in the centre is not a *system of constitution of order*, but only *a system of appearance of elements*. Since centre misses its *meaning* and *transformational role* there is so neither a *way of filtering new information* nor a *way of programming them*, only a destroyed sense of order either *ideal* or *symbolic*. It difines that although Islamic beliefs are still there among people, the symbolic expression of its ideals has been gone. Or, although all the symbolic elements of the Islamic city are still there in the built environment, their relation to each other and to the centre have been disintegrated. And, although people do participate in all social programming concerning their city and their city centre, the sense of the achievement of the 'unity' in every day practice, either *ideal* or *symbolic,* has been faded.

It defines that lack of appropriate spaces and their compatible usages causes improper social ambitious on developing and evaluating the structure of socio-spatial systems. The main effect of this is that people face problems in structuring their socio-spatial systems. This comes from unstructured changes which occur in their built environment. **The main role of the city centre is that it is itself the main conditions governing the continuity or transformation of the structure of the thought of the society via those socio-spatial systems**.

Whereas change in the built environment might not be the only cause for the changes in social relations, the author argues that it is one of the more important. It affects social relations indirectly but very efficiently as it involves everyday practice *either 'individually' or 'collectively'*, and *either 'ideally purposeful' or 'symbolically self-reflexive'*. In essence, it affects the structure of the thought of the society and disables it. It defines that although people have their own structure of thought, they become gradually unable to use it in the structure of their own built environment.

The Questionnaire

Orientation of space, its qualitative polarization, and the relation existing between space and form are essential elements of *symbolic expression of unity in Iranian Islamic cities*. In these cities, not only the structure of the city, either ideal or symbolic, emerges from the centre, but

also this structure itself directs all attentions to the centre. Here, the function of the centre - the order of unity (the structure) - and the message of the centre - the ideal of unity (the symbol) - are similar and over lapped. In them, Great Mosques are centre of space. They are centre of accessibility: the link between local and global; the link between elements to achieve the function; and the link between functions to achieve the essence - the unity (*the ideal principle of Islam*). Therefore, unlike a central 'position' in which a value (i.e. a symbol) is located - the value of a 'positional' centre, a central position is valued and related to everywhere in space - the value of a 'relational' centre. Location has only the value of 'position', but 'relation' has also the value of meaning: accessibility and admissibility.

When the architects' and planners' understanding of solving the need for access to the centre of an Islamic city - by simply carving fast roads through the intricate web of streets to the Great Mosque - confronts a destroyed sense of space and time, it is very important to consider people who are the main source of transformation and change. The social survey on Meshed examines the role of the city centre in conditions governing the continuity and transformation of the structure of the thought of the society over time. It is to define that the identification of spatial structure cannot be regarded as the only aim of environmental investigation. Instead, the instantiation of the structure in the reproduction of socio-spatial systems, as its medium and outcome, is the proper focus of environmental analysis. It is to indicate therefore that the best key to the *spatial structure* of a city is the generative rules underlying the material form, rather than simply the form itself.

The survey represents a further continuation of the *theory of structuration.* It is a semi-structured survey using the method of qualitative research which asks people about the reasons of their responses in order to have their opinion in-depth. According to the hypothetical model represented by the study, the construction of the responses represent peoples' attitudes to urban changes. Responses represent that the process of environmental changes not only has caused many negative consequences on spatial structure of the city but also has had many negative influences on philosophic structure of the thought of the society. They feel, nowadays, there is no unity between their social life and the spatial structure of the city. Generally mentioned by people of all age, education and occupation groups shows a clear

opinion about fabric changes which is concerned to social changes and concequently to ideal changes. They are aware of the social changes which reflect again to environmental realities.

They also represent the important role of *the structure of the thought of the society* beside *the institutional role of the people*. This represents the progressive individualization of the social programming which results from the progressive centralization of the social structure of the city. Within this respect, certain individuals gain a dominant role to determin the behaviour of the whole society. However, **the responses indicate that there are *more* problems with 'changed social relations' than 'lack of people's presence'. People do participate in every day social interactions, but they have changed their attitudes to social ideals. Also, there is no serious problem with 'lack of information' as it is with 'lack of competent relations between the infromation' - with changed principles. In fact, people do enjoy in having faithful social relations in everyday face-to-face interaction, but, the numbers indicate that whereas people need more information about 'social structure principles' the available information is more about 'instrumental principles' than 'structural ones'.**

Response also indicate that the process of environmental programming needs its *spatial relations* besides its *spatial elements* to influence the institutional programming of the ideal structure of the society and space. They represent that people have a sense of dissatisfaction about spatial milieu of their city. They have also mentioned that those problems are mostly happening in their city centre. **Althought people feel a sense of spirituality and intellectuality and even blessing in the Holy Harem, they have also a sense of loosing those senses in everyday life in the city centre. According to the structural programming of this city, priority is not the fast access to the centre, but the symbolic hierarchy of its spatial order to the centre.**

This indicates that **there is a lack of 'competent structural principles' in the spatial patterning of the socio-spatial systems**; and **even though 'instrumental principles' have been used to structure the environment in the way of achieving maximum instrumental interest of it, because of the lack of the 'symbolic principles' of social programming, they are not actually doing well in patterning the structure of socio-spatial systems**. As

a result, therefore, people face problems in structuring their socio-spatial systems. Although they have an undesirable sense of spatial spaces, they still use them and need them; and although they like their city centre and also other traditional textures, but they suffer from uncomfortable spatial experiences which are offered by the systemness of those spaces. **According to the inductive flow of the reviewing the case study these all affect those social relations which again cause spatial influences**.

Conclusively, the study's emphasis is on the fact that in the case of the city centre of Meshed, development like any other goods is imported into the process of the life of the city without any attention to the desire of the people. The author argues that, nowadays, whatever is important is neither the internal meaning or the message of the city - the ideal of unity - nor its living urban identity - the symbol of unity, but the external form of the city. Because they are just *stylistic ideas* which could be exported to every where, they only serve themselves and since they are not *structured ideals* which serve an end rather than themselves, they do not fulfill some operational need and ambition in society. They do not care for the genuine structure of the city, and by ignoring its living identity separate its united elements. **In this respect, 'centre' not only loses its ideal organization of space but also gains a non-organized stylistic design of forms and elements**.

Final Words

These all suggest that the culturally sanctioned values that are embedded in current attitudes towards city centre redevelopment design - lowering densities wherever possible, breaking up urban continuity into well-defined and specialized enclaves, increasing spatial scale, even separating and restricting different forms of movement and so function - are fundamentally inimical to the natural functioning of the city centre. It is not density that undermines the sense of well-being and safety in city centres, but sparseness; not small spatial scale, but its insensitive increasing; not lack of order but its superficial imposition; not the 'unplanned chaos' of the deformed grid, but its planned fragmentation[2]. Without an understanding of the spatial and functional nature of the city as a socio-spatial whole, there is a great danger of eliminating

[2] Hillier, B., 1996, "Cities as Movement Economies", Urban Design International, Vol. 1(1), pp. 41-60.

all the properties of controlled juxtaposition of uses, continuity, and integration of the urban fabric on which the well-ordering and well-functioning city centre depends.

Every competent member of society knows a great deal about the conditions of reproduction of the society - or institutional practices - of which he or she is a member: such knowledge is not incidental to the operation of society, but is necessarily involved in it. This is the whole point of these practices that social actors go through the structure of the thought of the society and develop it according to its ideal programming. Within this respect, external agencies could only prepare and facilitate the conditions and resources needed for empowering and enabling people to structure the structure of their socio-spatial systems. They should only design the rational and sensible horizon of change. Their dream system views might seem to be necessary for scheming such evolutionary development, but it is not sufficient to respond to the structural need of the society which is the real need of real practices. There must be some additional concerns to structural analysis of social-spatial systems which transforms socio-spatial processes into a more qualified and stable states.

Therefore, to observe the power of architecture and urban design - embedded in the proposed attitude of centrality towards city centres in this study - is not to observe any power of architects and urban designers. However, a truly professional practice in achieving any better socio-spatial practice is possible. There are three 'rules' for such a practice[3]: The first is that prevailing socio-spatial practices, supporting spatial forms and conjunctures, and the historical material context of such forms and conjunctures, are to be continually deconstructed and reconstructed to transform those practices and to redistribute present asymmetries of spatial resources. It is ideological practices at the 'institutional' level that are to be addressed[4]. The second - which logically precedes the first - is that the unacknowledged conditions and unintended consequences of design practices be discursively penetrated. Here, 'institutional'

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[3] King, R. J., 1988, "Urban Design in Capitalist Society", Environment and Planning Design: Society and Space, Vo. 6, pp. 445-474.

[4] Giddens distinguishes between two levels of 'ideological analysis', corresponding to 'strategic action' and 'institutional analysis'. Ideology as strategic action occurs in its most 'conscious' and 'superficial' form as discourse. By contrast, to analyse ideology institutionally is to show how symbolic orders sustain forms of domination in the everyday context of lived experience (pp. 90-91).

and 'strategic' aspects of ideology are both involved. And the third - which logically precedes both the first and the second - is that the logics and languages of presently autonomised discourses of the theoretical-cognitive, moral-practical and aesthetic-expressive domains be opened up and made accessible. It is ideology as 'strategic' action that is to be penetrated. Most immediately, the designers' education must being anew.

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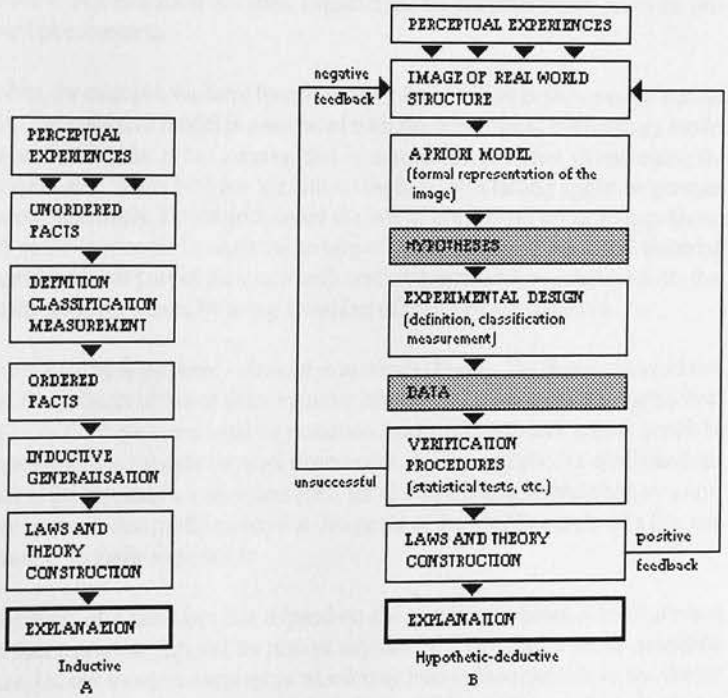
APPENDIX 1

INDUCTIVE DEDUCTIVE ROUTES TO SCIENTIFIC EXPLANATION

(Derived from: Holt-Jensen, 1988, , *Geography - History and Concept,* pp. 52-56)
Francis Bacon (1561-1626) defined the *inductive* route to scientific explanation. A scientist starts with a range of sense-perceptions that he works up conceptually and verbally into a number of loosely arranged concepts and descriptions that we like to call facts. Next, certain definitions are necessary in order to organize the data. Afterwards the facts are evaluated and arranged in relation to the definitions (Figure 1a).



Figures (1 a & b) Inductive (Baconian) and Hypothetic-Deductive Routes to Scientific Explanation (Source: Harvey, 1969)

The ordering and classification of data is often the chief activity of science in the early stages of its development. These first classifications may give only a weak explanatory function. Continuing study of the interaction between classes and groups of phenomena reveals a number of regularities; such regularities and laws may be called *inductive laws* since they are derived from the observations of a large number of single instances.

Here we must clarify what a *scientific law* is. Braithwaite (1953, p. 12) defines a law as 'a generalisation of unrestricted range in time and space', in other words, a generalization with universal validity. With this definition we can distinguish between empirical generalizations and laws. An empirical generalization is valid for a specific time and place but a law is universal. James (1972, p. 473) maintains that a law within Braithwaite's rigorous definition can hardly be formulated on the basis of geographical evidence. The only truly universal laws are those of physics and chemistry, although even in physics there are elements of uncertainty that make probability calculation necessary. **Harvey (1969, p. 31) gives the concept of law a much wider significance and postulates a threefold hierarchy of scientific statements from *factual statements* or systematized descriptions, through**

a middle tier of *empirical generalizations* or laws, to universal *theoretical laws*. We will use the expression 'law' in the wider sense adopted by Harvey. A scientist hopes to be able to link together a number of inductive laws that will include the relationships and association between the established laws. From this material he hopes to formulate general and overriding laws. The weakness of the inductive method is that the processes of ordering and structuring data are not independent of the theory that is ultimately constructed. The *a priori* establishment of a system of classification is an essentially similar operation to the setting up of an *a priori* theory.

Carl Ritter used the inductive method as a framework for his presentation of data and as a means to arrive at some simple empirical generalizations. From this material he hoped to gather evidence about the overriding principles in God's plan for humankind which he regarded as the underlying purpose of development on earth. Such a teleological philosophy cannot be tested empirically and therefore does not qualify as scientific explanation.

Harvey (1969, p. 438) considered that the teleological framework of explanation is possible without such a metaphysical assertion. A *teleological explanation* is generally taken to mean that a phenomenon is explained in relation to the purpose it is believed to serve. A mechanical or causal explanation, on the other hand, relies on pre-existing causes to explain the observed phenomenon.

A causal explanation is only reached when, for example, we have found the law of nature that is the cause of certain empirically observed single instances. The inductive model is associated with the teleological explanatory model and it will not really serve when we are looking for *prime causes*, that is, causes that are prior to and cause the phenomena that have been observed empirically. When Newton 'was hit on the head by a falling apple' he grasped the idea of a universal law of gravitation inductively. He could then set the law of gravitation up as an hypothesis but any confirmation of its universality could only come through the testing of a larger body of empirical material. The development of the natural sciences in the latter part of the nineteenth century provided the technical tools that made it possible to test hypotheses with some precision, by using a number of repeated experiments.

Inductive arguments were increasingly replaced by *hypothetic - deductive methods* (Figure 1b). Research workers, starting from an inductive ordering of their observations or from intuitive insights, tried to devise for themselves *a priori* models of the structure of reality. These were used to postulate a set of hypotheses which could be confirmed, modified or rejected by testing empirical data through experiment. A large number of confirmations were supposed to lead to the *verification* of the hypothesis, which was then, for the time being, established as a law. This law stood until the results of later research eventually rejected it. No proof of the absolute truth of a law can ever be produced as definite verification is virtually impossible.

Karl Popper has pointed out that the truth of a law does not depend on the number or times it is confirmed experimentally; it is easy enough to find empirical support for almost any theory. The criteria for its scientific validity are not the confirmatory evidence, but that those circumstances which may lead to the rejection of the theory are identified. It follows that a theory is scientific if it is possible to *falsify*. Kuhn criticizes Popper for believing a theory will be abandoned as soon as evidence is found which does not fit the theory. Kuhn maintains that all theories will eventually be confronted with some data which do not fit. A fundamental theory is not rejected if individual research data do not fit it, for if it were, then all theories would have to be rejected. Up to now the history of science does not record any theory which has not eventually been confronted by contradictory circumstances (or instances of falsification). According to Kuhn, a fundamental theory is only rejected when a new theory is put forward which is *believed* to be superior (Johansson, 1973).

Feyerabend adds that scientific development is much more *irrational* than Popper's scheme of falsification allows. Alongside straightforward arguments, the proponents of new theories have also often used propaganda and psychological tricks. Feyerabend does not believe that we would have had any science as we know it today if the principles of verification or falsification had been followed in every detail. Perhaps our world view would have still been geocentric. For Galilei stuck to his heliocentric world view although he could not find empirical proofs which would falsity the geocentric view. Feyerabend supports the view that the development of scientific knowledge follows an irrational almost anarchic path, along which almost anything goes, as far as methodology is concerned (Aquist, 1981, p. 11).

Kuhn does not accept Feyerabend's views of the irrationalities of scientific progress. He denies intending to present

scientific theories as intuitive and mystical; more appropriate for psychological analysis than for logical and methodological codification. On the contrary, Kuhn asserts that every scientist must gather as much rational proof in support of a new theory as possible and to be precise and honest in his work. This approach reflects the underlying values of science and scientific choice of theories rather than providing a blueprint as to how a scientific theory should be chosen and defended.

In spite of Kuhn's own statement, many observers believe, with Feyerabend, that the paradigm theory seems to suggest an element of irrationality in the course of scientific progress. It is an important part of Kuhn's approach that *data are dependent on theory*. All observations presuppose a certain conceptual apparatus by which the sense perceptions, or empirical; verifications, can be arranged. For example, the categories of language divide the reality in a particular way and will also guide our interpretations of our observations. Expectations and former ideas, that is, the hypothesis which have been set up, guide the interpretation of the data to a large extend. In this extreme form, this argument may lead us to believe that knowledge is a reflection of our ideas and has a rather slight relation to empirical data.

The alternative to such *relativistic* theories of knowledge is to line up with those who believe that that verification is possible through the hypothetical-deductive method, or to agree with Popper's belief in *falsification*. Maybe it is possible to reconcile these contradictions by maintaining that the discussion takes place on two different levels. The debate may have been based on a pseudo-disagreement. Popper has proposed an **ideal** way to carry out research. We might work towards this ideal but be unable to follow as the rules. Kuhn, on the other hand, describes how scientific work is **normally** carried out.

The hypothetic-deductive method has been recognized as the characteristic method of the natural sciences and for a long time was accepted by most research workers as the only method that was scientific. It was developed to its fullest extent in physics. In biology and geology the hypothetic-deductive method was less strongly developed than in chemistry and physics because of the type of the questions which must be answered and the nature of the empirical data studied in these disciplines. It is characteristic of the phenomena studied in physics that they are quantifiable. The phenomena of theoretical physics are, however, much more 'abstract' than those studied by biologists and geologists. As neutrons and atomic nuclei cannot be directly observed, measurement has provided a theoretical supposition of their existence. Theoretical physics operates in an abstract milieu, seeking unity and association through mathematical hypotheses and postulates. Physics has been able to develop into a model-building theoretical science precisely because it works with abstract a nd quantifiable phenomena and not because its phenomena are concrete and quantifiable. Geology and the systematic sections of biology study concrete phenomena which have a known position in time and space. They do not manifest themselves directly as quantities and theory plays a less important role in studying them. The same can be said about the phenomena studied in history, geography and the social sciences. It is significant, however, that psychology and the social sciences that study not so clearly identifiable social phenomena display stronger tendencies to theorizing.

APPENDIX 2

BIOLOGICAL HIERARCHY

(Derived from: Pattee, H. H., 1970, "Problem of Biological Hierarchy", pp. 128-135)
The hierarchical levels of our languages contain some of the deepest mysteries of logic as well as epistemology, but Pattee believes they also contain a clue to the physical problem of the hierarchical interface.

When we speak of the elementary laws of mechanics we mean the laws that describe as precisely as possible how each degree of freedom changes in time, given the initial conditions and boundary conditions. These equations of motion are universal and apply to all detailed motions which take place in the system. In one sense, therefore, all additional information about the system is either redundant or contradictory. But if we are trying to describe, say, 10^{23} molecules in a box, it is obvious that measuring or following each degree of freedom is impossible. However, as *outside observers* we have learned to recognize and define collective properties of molecules, such as temperature and pressure, which allow simple and useful measurements on the gas in the box. It is significant that these properties were measured long before their 'molecular basis' was known, just as many hierarchical biological functions were accurately described before a 'molecular basis' was discovered. In physics it was the later discovery of the molecular dynamics which began the controversial attempts to reduce thermodynamical description to mechanical description by rigorous mathematical arguments.

We may look at the problem as arising from the inability of the formal mathematics to predict what collective properties of complicated systems will produce simple, significant effects in the physical world of the observer. In other words, while there is no question that the detailed equations of dynamics can be used to calculate previously well-defined averages or collective properties, there is no way to predict from only the dynamical laws of the system which definitions of collective properties are significant in terms of what we actually can measure. Thus in one sense we can derive the pressure in terms of a suitable average of dynamical variables, if we are given a precise definition of pressure; but this definition of pressure is not determined by the equation of dynamics. The concept of pressure appears useful only when the dynamical system is embedded in a particular type of observational environment.

More generally we may say that a physical system which appears complete and deterministic with the most detailed symbolic representation can appear incomplete and probabilistic only with a new representation which relinquishes some of the detail. The new representation must therefore come about through the *combination* or *classification* of the degrees of freedom at the most detailed level so as to result in fewer variables at the new level. Formal reductionism fails simply because the number of possible combinations or classifications is generally immensely larger than the number of freedom. What must always be added to define a new representation is the rule of combination or classification which tells us how to simplify the details. In statistical mechanics this rule is usually a hypothesis of randomness or ergodicity, but the ultimate justification for any such rule is that it results in a more useful description of the system in the observational environment in which the system is embedded.

What can it mean, then, for a collection of particles to form an *internal* simplification or *self-* representation? What is the meaning of an 'observational environment' for a system which is closed? Clearly in an autonomous hierarchy there must be an internal separation of some degrees of freedom from other degrees of freedom which become constrained to impose collective and time-dependent boundary conditions on individual degrees of freedom. While we know such integrated systems exit in cells, and can design machines which operate in this way, we are still baffled by the spontaneous origin of this type of constraint.

It is in fact, a characteristic difficulty of hierarchical interfaces in biological organizations that their actual operation may appear quite clear while their origin is totally mysterious. The genetic code is a good example of a crucial hierarchical interface that is clear in its operation, but mysterious in its origin... Putting it the other way around, 'being hierarchic' requires that the system control its dynamic through an internal record, which has some aspects of 'self observation'.

But this is only evading the question. Let us see if we can clarify the problem of hierarchical origins by looking at collections of molecules of gradually increasing complexity, watching closely for any signs of internal *classification* or *recording* processes which are the essential conditions for a simplification of the detailed dynamics. If we can imagine such collections, then we may go on to ask if this internal simplification is inherently self-perpetuating, or if there appear to be additional conditions which must be satisfied to establish a persistent hierarchical organization of molecules.

Perhaps the simplest interesting level of complexity is crystal growth. First, consider an ideal, ionic crystal growing in solution. One might try to apply our hierarchical conditions by saying that the crystal surface, with its alternating positive and negative sites, 'classifies' the incoming ions, and by permanently binding each ion to a site with the opposite charge forms a 'record' of the classification interaction. Now while this may be grammatically correct, it is really only a redundant statement. There is no real distinction here between the physical interaction of the ion and the binding site and what we have called the 'classification' and 'record' of this interaction. They are all the same thing. Furthermore, each ion's interaction is local and direct and does not involve the dynamics of any large collection of ions or any delay. Therefore, although we may call this ideal crystal an example of hierarchical structure, I would not say that it exhibits hierarchical control over its dynamics.

Let us go on, then, to a more realistic level. Consider crystal growth which is produced by an imperfection, such as a screw dislocation. This is a *statistical* process which requires more than one atom or molecule to be in metastable positions. In time these atoms would shift to stable positions if there were no further growth. But this screw-dislocation structure increases the rate of growth by many orders of magnitude, all the time maintaining its special structure even though the original collection which first introduced the dislocation has been buried deep within the crystal. In this example, Pattee believes a strong case in favour of calling this a kind of hierarchical control. First, the constraint which controls the growth dynamics is not simply the direct interaction between local atoms, but involves the *collection* of atoms which makes up the dislocation. Second, this collection is not the original dislocation, but a *record* of a dislocation which is propagated over time intervals which are very long compared to the rate of addition of the individual atoms. However it is difficult to distinguish a classification process in this example since all the atoms are identical.

As a third, more complicated example, then, imagine a protoenzyme made up of only two types of monomers in a linear chain. Suppose this particular sequence of monomers folds up into a catalyst which speeds up the polymerization of only one type of monomer. For this specific catalytic reaction to occur we must express the fact that the folded polymer can distinguish one type of monomer from the other, and on the basis of this distinction alter the dynamics of each correct type of monomer so that it reacts much faster. Or in other words, we may say that this sequence of monomers *classifies* its elements and *records* this classification by forming a single, permanent bond between monomers. Now is there anything wrong with calling this process a form of hierarchical control?

In so far as the polymer sequences are no longer determined directly by the dynamical laws of the individual monomers (including their inherent reactivities), but by the constraints of a special polymer which speeds up the formation of a particular sequence, this might be called hierarchical dynamics. But now I think we have some problems of autonomy. First, this specific catalyst was invented by me, and although we know such specific catalysts do exist as enzymes, my invention simply evades the origin problem, as well as the physical problem of how such specific catalysts work. However, I Have in mind a problem which is much more important. I think this example misses the essence of hierarchical *control*. We may indeed have in the catalyzed homopolymer a kind of simple record of a rather complex dynamical interaction, but the record has no further effect.

The trouble is that in the context of autonomous hierarchies, what constitutes a 'record' must be indicated within the closed system itself and not by what we, as outside observers, recognize as a 'record'. Obviously to generate autonomous hierarchical control the record must be *read out* inside the system. The time-independent constraints formed by the permanent strong bonds must in turn constrain the remaining degrees of freedom in significant way. This was the case in the example of screw-dislocation crystal growth, where the dislocation structure was both a record of a past collective imperfection and a catalyst for the future binding of individual atoms. Cyril Smith (1968) sees this process as requiring a new description somewhere in between the detailed dynamics of atoms and the simple, stationary averages of thermodynamics. He sees all complex structure as both a record and a framework: "...the advancing interface leaves behind a pattern of structural perfection or imperfection which is both a record of historical events and a framework within which future ones must occur".

Returning to the copolymer system, we see that it may indeed fulfil the function of a record of past events, but the homopolymer record which was catalyzed does not act as a framework for future events. To provide autonomous hierarchical control, the catalyzed product of one copolymer must lead to the catalysis of other specific reactions. Furthermore, if the record is not to be lost, each catalyzed sequence must in turn catalyze another, and so no indefinitely. Now clearly such a sequential process can be divergent or convergent depending on the rules of specificity for the catalyses. Even if we assume that there is no error in these rules, a divergent record would never be recognized. One might say, in this case, that the system's self-representation is as complex as the system itself. But I think no *under*constrained system would produce such a chain of catalysts. The starting record would simply disintegrated.

Going back now to the hierarchical control in the screw-dislocation crystal growth, we may look at this example as the other extreme. Here the classification and record possibilities are trivially *over*constrained. Since there is only one distinguishable type of monomer, there can be no classification and hence no linear record. The 'record' is not distinguishable from the three-dimensional structure which is also the functional catalytic site. The same problem of *over*constraint could, of course, occur in a copolymer system where, say, an alternating-sequence polymer acts as a tactic catalyst for the same alternating sequence. I want to show that even the simplest hierarchical organization requires a balance between the numbers of degrees of freedom of its elements, the number of fixed constraints, which function as a record, and the number of flexible constraints which encode or transcribe the record.

Of course from this simplest conceivable level of molecular assembly which exhibits a potential classification-record-control process, we should not expect to find the nature of hierarchical interfaces at all levels. Even these simple examples present unanswered questions. But in following the necessary physical steps leading from the dynamics of individual units to the collective control of individual units, I believe we can gain some insight into the spontaneous generation of hierarchical organization.

First, we see that the individual particles or units follow more or less deterministic laws of motion. These units were atoms and molecules in Pattee's examples, but he also think of the units as cells, multicellular individuals, or population units. The 'motions' of these larger units are not as deterministic as the motion of atoms, but they have definite patterns of unit behaviour.

Second, there are forces between units which produce constraints on the individuals. These forces cause permanent aggregations of units which act as relatively fixed boundary conditions on the remaining individuals. By 'relatively fixed' Pattee means that the rate of growth or change of these aggregations is slow compared to the detailed motion of individual units. These strong forces form what Pattee called structural hierarchies, but they are essentially passive constraints.

And finally the third stage is crucial and the most mysterious. If the fixed constraints are not too numerous, that is, if the aggregations are not too rigid, then *weak forces* become important in the internal dynamics of the aggregations and through this *collective* dynamics the aggregations can form *time - dependent boundary conditions* for the other individual units. This type of flexible constraint reduces the number of possible trajectories of individual units without reducing the number of degrees of freedom. This amounts to a *classification of alternatives* which leads us now to use the higher language of information or control. The specific catalyst is the simplest example of such a dynamical constraint; but at any level of hierarchical control where there are ordinary molecules which also act as messages, or where simple physical objects are said to convey information, there must be the equivalent of such dynamical constraints which classify alternative motions by leaving a record of their collective dynamical interactions.

As we said earlier, it is in the simplicity or relevance of these records or messages that we recognize hierarchical control; but how this simplicity originates remains a mystery. In practice, when a dynamically complex system exhibits simple out puts or records of its internal motions we switch languages from the detailed dynamical description to a higher language, which relinquishes details and speaks only of the records themselves. We might think of our simplified language as an *effect* necessitated by a system that is too complicated to follow in detail... On the other hand, in systems which exhibit autonomous hierarchical organization, it is the internal collective simplifications which are the *cause* of the organization itself. In this sense, then, a new hierarchical level is created by a new hierarchical language. Simon has come to a similar conclusion from observing a broad class of hierarchical organizations. He calls the lower level language a detailed 'state description' and the upper level

language a simple 'process description'. But the fact remains that whether it is the system-observer interface in physics, the structure-function interfaces in biology, or the matter-record interface in the most primitive molecular hierarchies, these levels are presently established only at the cost of creating separate languages for each level.

What we find is that even the lowest interesting example of a hierarchical interface is beset with precisely those difficulties that we find in all hierarchical structures, namely, that each side of the interface requires a special language. The lower level language is necessary to give what we might call the legal details, but the upper level language is needed to classify what is significant. As Polanyi has so clearly pointed out, living organizations are not distinguished from inanimate matter because they follow laws of physics and chemistry, but because they follow the constraints of these internal, hierarchical languages.

It is therefore difficult for me to escape the conclusion that to understand what we mean by a record or a language in terms of a lower level language, or ultimately in terms of elementary physical concepts. Physicists have worried about the inverse problem for many years. In fact a large part of what is called theoretical physics is a study of formal languages, searching for clear and consistent interpretations of experimental observations. Biologists have never paid this much attention to language, and even today most molecular biologists believe that the 'facts speak for themselves'. Hopefully, as these facts collect, biologists, too, will speak some general interpretations. All these facts tell us at present is that life is distinguished from inanimate matter by exceptional dynamical constraints or controls which have no clear physical explanation. We will not find such as explanation by inventing new words for *our* description of each level of hierarchical control. Instead, we will have to learn how collections of matter produce *their* own description. (Pattee, H. H., 1970)

APPENDIX 3

QUESTIONNAIRE (BLANK)

People's Attitudes to the City Centre

General description of responder **Code No:** .....

Name (no obligation): ..... Interviewer: .....
Age: ..... Sex: ..... Date of interview: .....
Occupation: ..... Time start: .....Time end: .....
Educational status: ..... Place of interview: .....
Address: ....
....

1) Mention two features you most like about Meshed, please give two reasons why you like them.

a. ..... 1. .....
2. .....

b. ..... 1. .....
2. .....

2) Mention two features you don't like about Meshed, please give two reasons why you don't like them.

a. ..... 1. .....
2. .....

b. ..... 1. .....
2. .....

3) Mention two features you liked about Meshed which have now disappeared, please give two reasons why you liked them.

a. ..... 1. .....
2. .....

b. ..... 1. .....
2. .....

4) Mention two features you don't like about Meshed which have now disappeared, please give two reasons why you don't like them.

a. ..... 1. .....
2. .....

b. ..... 1. .....
2. .....

5) Mention two changes you would like to see in Meshed's future, please give two reasons for each.

a. ..... 1. .....
2. .....

b. ..... 1. .....
2. .....

6) Mention two changes you wouldn't like to see in Meshed's future, please give two reasons for each.

a. ..... 1. .....
2. .....

b. ..... 1. .....
2. .....

7) Mention who you would like to make the changes.

a. .....

8) Mention two ways in which you would like to participate in the improvement of the quality of life in Meshed.

a. .....
b. .....

9) Mention two ways in the past which increased people's contribution to the character of the city of Meshed, please give two reasons how they worked.

a. ..... 1. .....
2. .....

b. ..... 1. .....
2. .....

10) Mention two reasons why, nowadays, people cannot contribute to the character of the city of Meshed.

a. .....
b. .....

11) Mention two ways in which future generations will know about the values and life of the people, please give two reasons how they work.

a. ..... 1. .....
2. .....

b. ..... 1. .....
2. .....

12) Mention two reasons why future generations will not know about the values and life of people, please give two reasons why.

a. ..... 1. .....
2. .....

b. ..... 1. .....
2. .....

13) Mention two important places in Meshed where it is easier to understand about the people, the city and the life in general, please give two reasons why they are important.

a. ..... 1. .....
2. .....

b. ..... 1. .....
2. .....

14) Mention two places in Meshed where you would tell visitors to visit, please give two reasons why they are important to be visited.

a. ..... 1. .....
2. .....

b. ..... 1. .....
2. .....

15) Mention one place in Meshed where you would mostly want to go, please give three reasons why.

a. .....
1. .....
2. .....
3. .....

16) Mention two important features you most like in Meshed City Centre, please give two reasons why you like them.

a. ..... 1. .....
2. .....

b. ..... 1. .....
2. .....

17) Mention two important features you dislike in Meshed City Centre, please give two reasons why you dislike them.

a. ..... 1. .....
2. .....

b. ..... 1. .....
2. .....

18) Mention three things that give identity to Meshed City Centre and you like, please give two reasons for each.

a. ..... 1. .....
2. .....

b. ..... 1. .....
2. .....

c. ..... 1. .....
2. .....

19) Mention three things that give identity to Meshed City Centre and you dislike, please give two reasons for each.

a. ..... 1. .....
2. .....

b. ..... 1. .....
2. .....

c. ..... 1. .....
2. .....

20) Mention two annual events which take place in Meshed City Centre which give its character and identity, please give two reasons for each.

a. ..... 1. .....
2. .....

b. ..... 1. .....
2. .....

21) Mention three things people usually do in their everyday life in the City Centre.

a. .....
b. .....
c. .....

22) Mention two reasons why you go to the City Centre.

1. .....
2. .....

23) Mention three similar aspects or things you would find in your house and in the City Centre.

a. .....
b. .....
c. .....

24) Mention two important aspects or features you think are necessary to be protected in the City Centre, please give two reasons for each.

a. ..... 1. .....
2. .....

b. ..... 1. .....
2. .....

25) Mention two important features, things or events you see on your way to the City Centre, please give one reason why they are important.

a. ..... 1. .....
b. ..... 1. .....

26) Mention two important admire changes which have been occurred recently in the City Centre and you like.

a. .....
b. .....

27) Mention two important changes which have been occurred recently in the City Centre and you dislike.

a. .....
b. .....

28) Mention two advantages of the ring road round the Holy Shrine, please give two reasons for each.

a. ..... 1. .....
2. .....

b. ..... 1. .....
2. .....

29) Mention two disadvantages of the ring road round the Holy Shrine, please give two reasons for each.

a. ..... 1. .....
2. .....

b. ..... 1. .....
2. .....

30) Mention two advantages of the open space and the parking area round the Holy Shrine, please give two reasons for each.

a. ..... 1. .....
2. .....

b. ..... 1. .....
2. .....

31) Mention two disadvantages of the open space and the parking area round the Holy Shrine, please give two reasons for each.

a. ..... 1. .....
2. .....

b. ..... 1. .....
2. .....

32) Mention two advantages of the under ground route round the Holy Shrine, please give two reasons for each.

a. ..... 1. .....
2. .....

b. ..... 1. .....
2. .....

33) Mention two disadvantages of the under ground route round the Holy Shrine, please give two reasons for each.

a. ..... 1. .....
2. .....

b. ..... 1. .....
2. .....

34) Would you like to say more about the City Centre?

.....
.....

Thank you very much for your help in completing this questionnaire.

PLEASE REMEMBER THAT THIS QUESTIONNAIRE IS FOR RESEARCH PURPOSES ONLY AND ANY INFORMATION PROVIDED WILL REMAIN CONFIDENTIAL.

APPENDIX 4

QUESTIONNAIRE (FILLED)

People's Attitudes to the City Centre

General description of responder **Code No:** *8* .....

Name (no obligation): .....
Age: *43* ..... Sex: *Male* .....
Occupation: *Medical Clinic Staff* ...
Education: *High School Diploma* ....
Address: .....
.....

Interviewer: *Barghjelveh* .....
Date of interview: *Aguest 1995* .....
Time start: *9 am* Time end: *10 am* ...
Place of interview: *Medical Clinic* .....
.....
.....

1) Mention two features you most like about Meshed, please give two reasons why you like them.

a. *Presence of the Holy Shrine* .....
1. *Idiological, Being a Shiite* .....
2. *Historical, Being a Genuine Place* .....

b. *Being Blessed with many Resources*
1. *Because of the Pilgrims of the Holy Shrine* .....
2. .....

2) Mention two features you don't like about Meshed, please give two reasons why you don't like them.

a. *Crowded* .....
1. *Disturbing Peace* .....
2. .....

b. *Traffic* .....
1. *Lossing Time and Energy* .....
2. .....

3) Mention two features you liked about Meshed which have now disappeared, please give two reasons why you liked them.

a. *People Treated each other Kindly*
1. *Benevolent Acts* .....
2. *Good Behaviours and Happiness* .....

b. *The Old Texture of the City* .....
1. *National and Islamic Identy* .....
2. *Personal and childhood memories* .....

4) Mention two features you don't like about Meshed which have now disappeared, please give two reasons why you don't like them.

a. *Ruined Places Round the Holy Shrine*
1. *Not Suit to the Holy Texture of the City* .....
2. .....

b. *Old Buildings, Narrow Streets and Alleys*
1. *Limitation of Space* .....
2. .....

5) Mention two changes you would like to see in Meshed's future, please give two reasons for each.

a. *Maturity in Choosing and Using the Facilities*
1. *Improvement of the Traffic System* .....
2. *Quikness of Affairs* .....

b. *Coming Back of the People's Good Behaviour*
1. *Cooperation and Contribution* .....
2. *Being Blessed in Daily Troubles* .....

6) Mention two changes you wouldn't like to see in Meshed's future, please give two reasons for each.

a. *The Holiness of the Place* .....
1. .....
2. .....

b. *People's Good Will* .....
1. .....
2. .....

7) Mention who you would like to make the changes.

a. *People: because it is cheaper, quicker, better and more comfortable; because of taking care, maintaining, supporting and sustaining of facilities.*

8) Mention two ways in which you would like to participate in the improvement of the quality of life in Meshed.

a. *Starting from my own living and working places, arranging the places according to humanity and Islamic beliefs*
b. *Obeying desciplines in order to develop people's faith, purity and honesty.*

9) Mention two ways in the past which increased people's contribution to the character of the city of Meshed, please give two reasons how they worked.

a. *Religious Aspiration in Building Holy Places such as Mosques*
1. *People's Inner Beliefs* .....
2. *Having Lots of Experiences* .....

b. *National Aspiration in Building Urban Facilities such as Baths*
1. *People as the Infrastructure of the Community*
2. *Forming an Organic Participation; Forming an Eternal Sustaining*

10) Mention two reasons why, nowadays, people cannot contribute to the character of the city of Meshed.

a. *Pre-occupation of people's Mind; Not Properly Taking Adventage of People's Good Faith*
b. *State Rules* .....

11) Mention two ways in which future generations will know about the values and life of the people, please give two reasons how they work.

a. *History* .....
1. *Traditional Customs* .....
2. .....

b. *Chest to Chest* .....
1. *Education* .....
2. .....

12) Mention two reasons why future generations will not know about the values and life of people, please give two reasons why.

a. *Destroying Traditional Buildings and Textures*
1. .....
2. .....

b. *Change of Values* .....
1. .....
2. .....

13) Mention two important places in Meshed where it is easier to understand about the people, the city and the life in general, please give two reasons why they are important.

a. *Holy Shrine and Sacred Places*
1. *Great Population, Place of Meeting and Social Relations*
2. *Great Pilgrims, Place of Ideological Relations* .....

b. *Traditional Bazaar* .....
1. *Enjoying, Sightseeing and Walking for Pleasure* ....
2. *Lots of Facilities; Buying Needs and Goods* .....

14) Mention two places in Meshed where you would tell visitors to visit, please give two reasons why they are important to be visited.

a. *The Holy Shrine and Ancient Bazaar*
1. *More Information about People* .....
2. .....

b. *Tomb of Ferdowsi* .....
1. *National Monument* .....
2. *CountryClimate* .....

15) Mention one place in Meshed where you would mostly want to go, please give three reasons why.

a. *The Holy Harem* .....

1. *Heavenly Remuneration* .....
2. *People respect each other* .....
3. .....

16) Mention two important features you most like in Meshed City Centre, please give two reasons why you like them.

a. *Intellectuality and Spirituality*
1. *Blessing* .....
2. *Meeting People and Getting Know Each Other* .....

b. *Traditional Buildings* .....
1. *Old Memories* .....
2. .....

17) Mention two important features you dislike in Meshed City Centre, please give two reasons why you dislike them.

a. *Crowded* .....
1. .....
2. .....

b. *Traffic* .....
1. .....
2. .....

18) Mention three things that give identity to Meshed City Centre and you like, please give two reasons for each.

a. *Uniqueness* .....
1. *Spirituality* .....
2. *Blessing* .....

b. *The Dome of theHoly Shrine*
1. *Indication of Ideology* .....
2. *Indication of Nationality* .....

c. *Architectural Monuments* ....
1. *Islamic Heritage* .....
2. *National Heritage* .....

19) Mention three things that give identity to Meshed City Centre and you dislike, please give two reasons for each.

a. *Chaos* .....
1. *Disorder Traffic System* .....
2. *Lack of Facilities* .....

b. *Confusion* .....
1. *Lack of Regularity* .....
2. .....

c. *Lack of Organization* .....
1. *Disorder Environment* .....
2. .....

20) Mention two annual events which take place in Meshed City Centre which give its character and identity, please give two reasons for each.

a. *The New Year's Day* .....
1. *Religious and National Customs* .....
2. .....

b. *Seasonal Pilgrimages* .....
1. *Visiting People and Pilgrims* .....
2. .....

21) Mention three things people usually do in their everyday life in the City Centre.

a. *Getting Access to Needs, Shopping* .....
b. *Visiting People, Attachment* .....
c. *Walking for Pleasure, Recreation* .....

22) Mention two reasons why you go to the City Centre.

1. *Illumination and Purification of Heart* .....
2. *Shopping* .....

23) Mention three similar aspects or things you would find in your house and in the City Centre.

a. *Security* .....
b. *Education* .....
c. *Satisfaction* .....

24) Mention two important aspects or features you think are necessary to be protected in the City Centre, please give two reasons for each.

a. *Sacrosanctity of the Place*
1. Traditional and Islamic Customs .....
2. .....

b. *People's Satisfaction* .....
1. *Social Customs* .....
2. .....

25) Mention two important features, things or events you see on your way to the City Centre, please give one reason why they are important.

a. *Great Population* .....
1. *Social Relations; From Privacy to Public* .....
b. *New Buildings* .....
1. *Moving From Tradition to Modernism* .....

26) Mention two important admire changes which have been occurred recently in the City Centre and you like.

a. *Development of the Holy Shrine* .....
b. *Constructing New Buildings* .....

27) Mention two important changes which have been occurred recently in the City Centre and you dislike.

a. *Destroying Traditional Textures* .....
b. *Destroying Traditiona Bazaar* .....

28) Mention two advantages of the ring road round the Holy Shrine, please give two reasons for each.

a. *There is no advantage* ..... **1.** .....
2. .....

b. ..... **1.** .....
2. .....

29) Mention two disadvantages of the ring road round the Holy Shrine, please give two reasons for each.

a. *Traffic deter people and people deter traffic* **1.** .....
2. .....

b. ..... **1.** .....
2. .....

30) Mention two advantages of the open space and the parking area round the Holy Shrine, please give two reasons for each.

a. *Hygiene Care* ..... **1.** *Air Circulation* .....
2. .....

b. *Possibility of Temprory Settelment* **1.** .....
2. .....

31) Mention two disadvantages of the open space and the parking area round the Holy Shrine, please give two reasons for each.

a. *Emptiness* ..... **1.** *Meaningless* .....
2. *Lack of Holiness* .....

b. *Lack of Direction* ..... **1.** *Lack of Organization* .....
2. .....

32) Mention two advantages of the under ground route round the Holy Shrine, please give two reasons for each.

a. *There is no advantage* ..... **1.** .....
2. .....

b. ..... **1.** .....
2. .....

33) Mention two disadvantages of the under ground route round the Holy Shrine, please give two reasons for each.

a. *Lossing the holiness of the place* **1.** .....
2. .....

b. *Having more Traffic* ..... **1.** *Causing Caos* .....
2. .....

34) Would you like to say more about the City Centre?
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